

The Finest Dental Offices in the World.

Description by RODRIGUES OTTOLENGUI, M.D.S., New York City.

When the writer first became the editor of ITEMS OF INTEREST, he conceived the idea of publishing descriptions of dental offices and laboratories. He had himself profitted much by visiting the offices of many men in various cities, and it seemed practicable to maintain a department in ITEMS OF INTEREST in which our readers might obtain similar benefits without actually traveling about the country. This department, *"Office and Laboratory,"* was conducted, with advantage, for a considerable period, but was finally abandoned because of the difficulty of securing descriptions of those practical ideas in regard to office equipment or office management, which, being in a sense a part of the daily office routine, were overlooked by the writers of the articles; yet it is these very things which would most attract the attention of a visiting brother.

Within the past year the writer has had several opportunities of visiting an office building so unique and so remarkable in its equipment that he has obtained the consent of the owner, Dr. A. C. Fones, to describe and illustrate it for the benefit of our readers. We do this with the greater pleasure because of the fact that it not only is probably the first private building constructed and used wholly for dental purposes, but also because in years to come it will be pointed out as the place in which the first school for the training of dental nurses was established.

Dr. A. C. Fones, whose offices we will presently describe, lives in

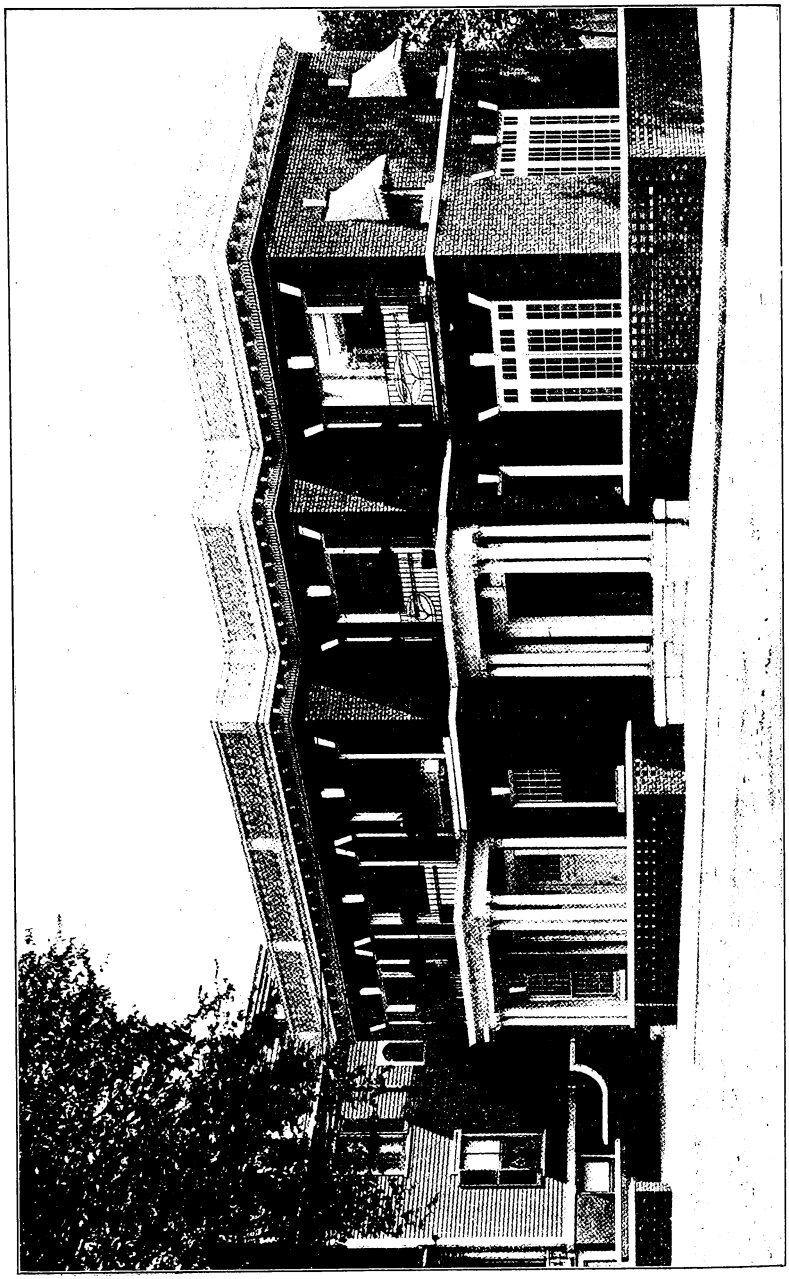


Fig. 1.

Bridgeport, Conn., and is the chairman of the Committee on Oral Hygiene of the National Dental Association. For a great many years Dr. Fones has been the advocate of the trained dental nurse, and to many doubting Thomases during the past winter he has proven the efficacy of his system. On several occasions he has entertained visiting dentists from Massachusetts, New York and other States, exhibiting patients "with teeth of pearl set in gums of pink coral." Dr. Fones claims not only that diseased soft tissues about the teeth may be restored to health, but that even so-called "healthy tissues" may be so improved that they take on a firmness and beauty never seen in an untreated mouth. In this work he has the aid of prophylactic assistants, "dental nurses," women trained to expertness in their field, while limited to that sphere which confines their work to the enamel-covered surfaces of the teeth in the main, and rigidly restricts them from interfering in the presence of pathological conditions.

For a number of years Dr. Fones has been advocating the establishment of a system of preventive clinics in the public schools, and did finally obtain an appropriation of several thousand dollars for an experimental preventive clinic, in order to test the benefits that might accrue. Unfortunately, the Board of Education of Bridgeport appointed a committee that did not work harmoniously, and Dr. Fones, rather than see his work foredoomed to failure, resigned. As a result, either there will be no clinic at all, or else, if a clinic be established, it will probably be like all others which have started up about the country, and which may be termed "curative clinics." This will undoubtedly be of service, and many school children will be benefitted by having a place to which they may be sent for the relief of pain, and, indeed, such a clinic will be an advantage even when the preventive clinic is introduced, as it must be in the end. For Bridgeport and all other municipalities will come to learn that the old adage, "An ounce of prevention is worth a pound of cure," is as applicable here as it is true.

Dr. Fones, though disappointed, has risen above discouragement, and, while withdrawing from the Bridgeport School Clinic, has announced that he will during the coming winter establish a lecture course and training school for thirty dental nurses. This school will be conducted in his building, and no more suitable environment for such a school can be imagined than this dental office building, which throughout is constructed in accordance with the very latest ideas in hospital asepsis.

Fones's Office Building.

In Fig. 1 we see the exterior of Dr. Fones's office building. It faces about due north and is constructed of Fisk tapestry brick of twelve different shades, the trimming being of white marble. The

frontage is eighty feet. Two entranceways are seen. The one nearest to the corner is the main doorway to the office, while the other leads directly into a garage. Patients who arrive in their cars may thus drive into the garage, from which access may be had to the hall leading to the reception room. This reception room (Fig. 2) is lighted by the two windows seen in Fig. 1 at the corner of the building, front and side. All the lower floor, except the garage, is covered with red Welsh tiles, as

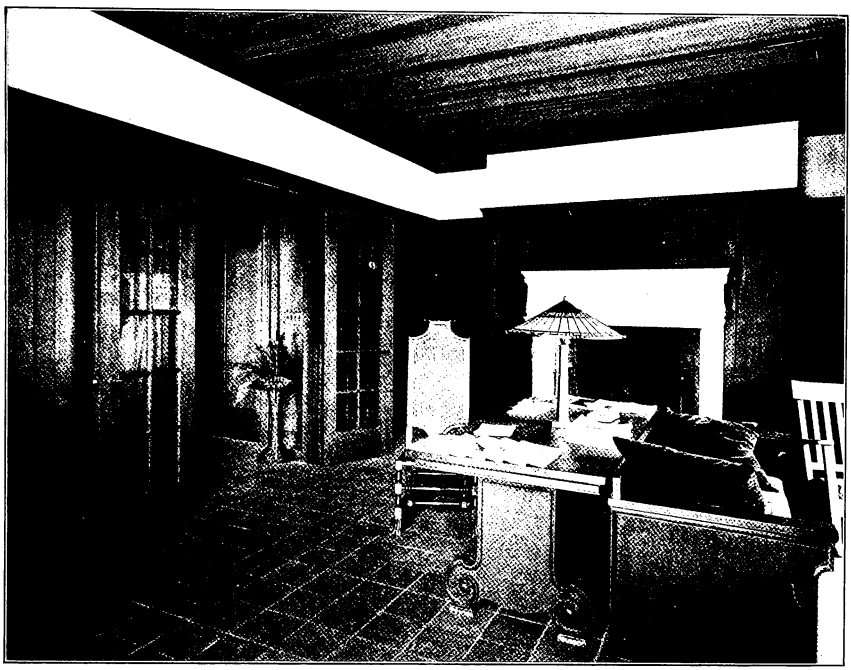


Fig. 2.

can be seen in Fig. 2. The waiting room is panelled to within two and a half feet of the ceiling with American hazel, finished in soft brown. Above the panelling is a border of Caen stone, two and a half feet wide, and the carved mantelpiece is of the same stone. The ceiling is beamed with plaster between, finished in same color and grain as the wall panels. The red-tile floor, with the warm brown walls relieved by the cool white Caen stone, all combine to produce a harmonious and sumptuous effect which invites repose, so that patients do not tire if asked to wait in this most comfortable apartment. The lamp seen on the center table was

especially constructed for this room, the shade carrying colors which beautifully blend with the environment.

Dressing Rooms.

On this floor there are dressing rooms for men and for women. The men's rooms include a coat room and a room containing a lavatory and toilet. The walls are finished in buff and the woodwork in white enamel.

The ladies' room contains six lockers, painted in white enamel, for hats and coats. There is also a porcelain dressing table and lavatory, a toilet, sterilizer for brushes and combs, etc. The walls are finished in buff and the woodwork of white enamel, as in the men's rooms.

Secretary's Room.

In Fig. 1, between the entranceways, will be seen a window, and through the pillars of the main doorway can just be seen another window. Both of these open into the room of the secretary, who is thus afforded opportunity to observe the entire floor. She can see patients at the front door, and by pushing a button she can open the door automatically. She can see the entrance to the women's room and also the door of the men's room. She can see the stairway up to the operating floor; she is also close to the waiting room. A Western Union clock faces her from the hall. Her room is equipped with files, a typewriting desk, steel cabinet safe for books, records, etc. A chute from her room leads to a letter box outside for mailing, and another from the upper floor brings her charge slips, letters to be written or placed on file, etc. There is a telephone system throughout the building, by which she can connect any room with any other room, or with the outside telephone system.

A large closet at the end of the main hall is used for carrying all supplies needed.

Garage.

The garage is large enough to accommodate four cars, and has been used by Dr. Fones for giving stereopticon lectures and demonstrations to municipal officers and others interested in the welfare of public school children. It is this commodious room which will be utilized by Dr. Fones for his training school for dental nurses, in which enterprise he has already enlisted the services of prominent physicians and dentists who will lecture to the girls.

Stairway.

A beautiful yet severely simple stairway leads to the second floor. The staircase is of Italian marble, and the side walls are panelled in American hazel. From the level of the upper floor the upper part of the stair-

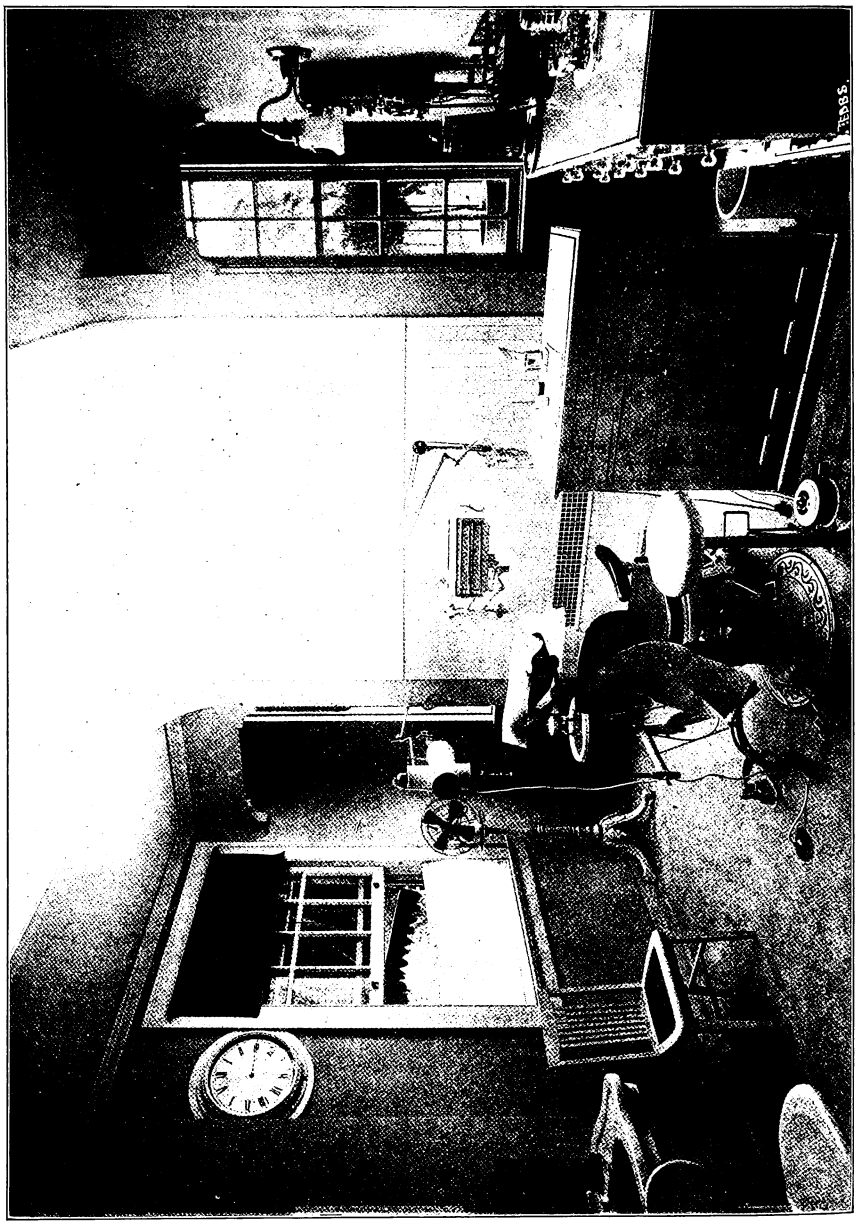


Fig. 3.

well is formed in arches made of plaster and stained buff. Over the stair-well is a skylight in three large panels, of Greek lattice design, in colors. Twelve Tungsten lamps above the glass panels may be used for illuminating the stair-well.

All the floors on the second story are made of a composition known as "Sanitas," made by the Marbleoid Company, and the floors and bases around the sides of the rooms are constructed so as to be continuous with one another. The color is a light gray.

On this floor are four operating rooms, the side walls of which are finished in water color, French gray, with ceilings a very light cream. All woodwork is white enameled; cabinets and furnishings in all four rooms in white and nickle. White silk tubing is used for all cuspidors, compressed air and electric wiring.

Dr. Fones's Personal Office.

In Fig. 3 is shown the interior of the office used by Dr. Fones personally. Perhaps the most interesting features are the methods of lighting and heating. If we look again at Fig. 1 we observe that on the second story, at the end over the waiting room, there is a wide window in the front and two smaller windows in the side. One of these latter opens into Dr. Fones's operating room and the other into a private office adjacent. The wide window in the front is the main source of light for the operating chair. A close examination of the illustration shows that there is a very deep wainscoting, with a second glass within. These two sets of glasses are placed about twenty inches apart, and a doorway allows ingress to the space between for purposes of cleaning, etc. The floor in this space is set two and a half feet above the main floor, and between the two floors and behind a panel is a hot-water radiator. Cold air enters through a grill at the main floor level and passing over the heating apparatus is expelled through another grill set in the panel, and thus enters the office just in front of the operating chair (see Fig. 3). Light not only enters the office through this front window, but there is a skylight in the roof which extends back over the operating chair. The inner glass, which, as has been explained, is twenty inches inside of the outer window, is clear glass in the center, but ground along the border (Fig. 3). Overhead is a glass six feet square, which is protected from the weather by the upper glass of the roof skylight. This ceiling glass is ground on one side, and a cloth curtain above the ceiling glass can be operated to cut off or temper the light. Between the front clear glass and the ground glass of the ceiling a curved ground glass unites the two, the whole appearing as an almost continuous curved window light.

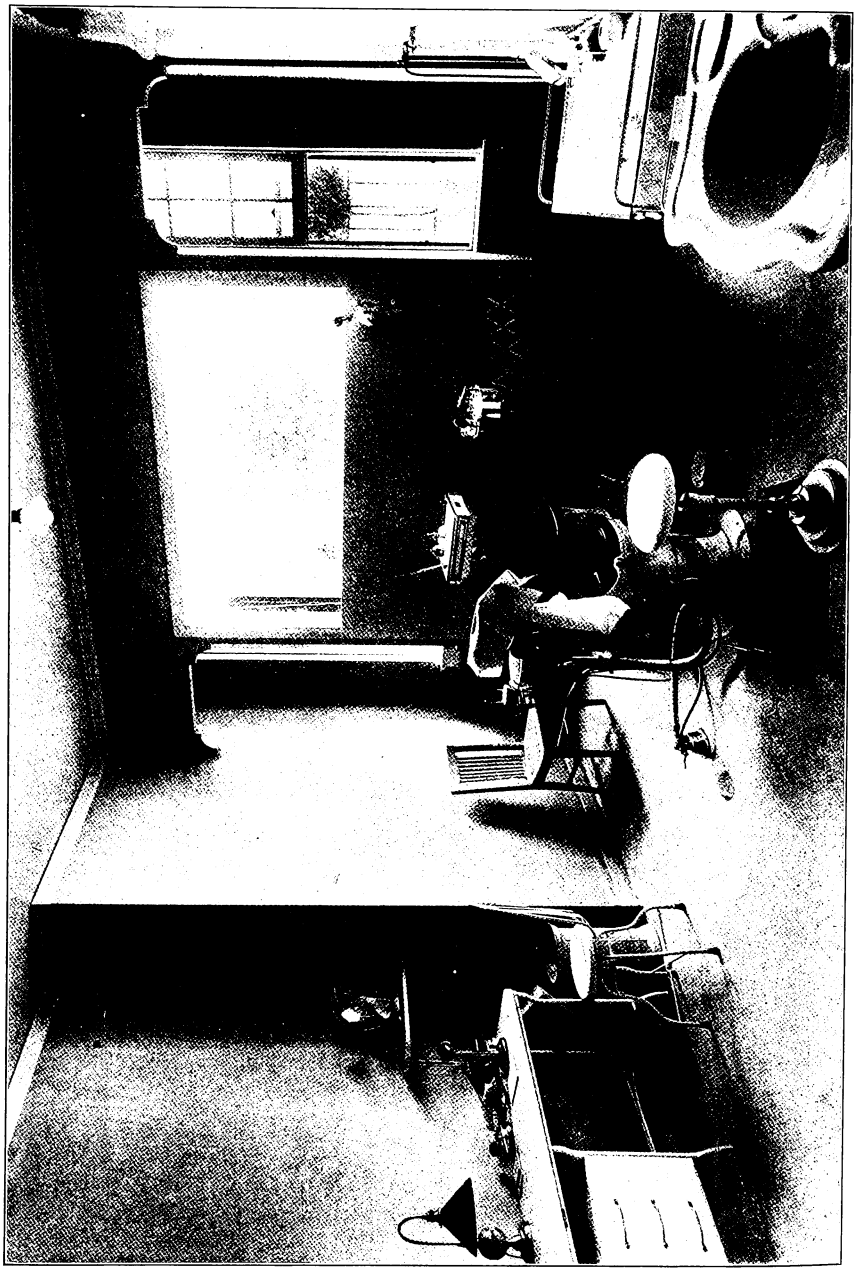


Fig. 4.

Four powerful Tungsten lamps above the ceiling glass are used for illumination on dark days.

A white enameled stomatoscope is seen in the illustration at the side of the chair. This is furnished with an eighty-candle power Tungsten lamp, for use when needed in operating.

Foot stirrups are set in the floor to rest the feet and hold the body in a comfortable position while operating.

The cabinets are of white enamel with cut-glass knobs, and between them is seen a porcelain receiver for soiled towels.

On the wall is seen a Western Union clock, under it a porcelain lavatory, and in the corner an electric fan with white enamel base.

Woodwork in this room is of white enamel, the doors of mahogany and the knobs of glass.

Just back of the operating room is a private office containing writing desk, files, couch, table, etc. There is a large closet for changing from street garments to white operating suits.

The walls in this room are buff in color and the woodwork dark brown.

Prophylactic Rooms.

There are two prophylactic rooms used by dental nurses. One of these is shown in Fig. 4. These rooms are furnished with white operating chairs, with white stomatoscope lamps attached; white enameled willow couches, white enameled nurses' desks, cabinets and chairs; combination sterilizer, spray and water heater, white brackets and engine.

A third office, exactly similar to the prophylactic rooms, is used by Dr. Fones's associate, Dr. R. E. Tuthill.

These three offices are lighted somewhat differently from the main office, yet the light is abundant. There is no overhead light (see Fig. 4), but the inner window pane, as before, is set twenty inches inside of the outer window, and between the two is a similar air-warming apparatus.

Laboratory.

Immediately beyond the offices is the laboratory. A glance at Fig. 1 will show the windows on the second floor, each of which lights one of the offices, the last entering the laboratory. The interior of the laboratory is shown in Fig. 5, where we see that two large skylights permit the entrance of additional light. To the right of the illustration is seen a bench which can be entirely separated from the main room by lowering the window sash in front of the bench. This is fitted up with a chemical hood with flue having exit through the roof, thus carrying off all gases or odors arising from the use of acids, soldering, casting or vulcanizing. There is a separate bench for rubber work, and the front bench is divided

into special parts for porcelain work and crown and bridgework, with all tools or instruments for each department carried in drawers attached to that section of the bench. The lathe is removable and can be used in any section of the laboratory. There are numerous outlets for compressed air, electricity and gas.



Fig. 5.

To the left in the illustration are seen the lavatories, and in the center a plaster and moulding bench; this is covered with sheet copper and is well lighted, being immediately under the skylights.

X-Ray and Lunch Room.

Across the hall from the laboratory is the X-ray room and lunch room combined. At one end of the room is the X-ray outfit for taking radiographs, with all the paraphernalia for developing the films, as the room can be made into a dark room very quickly. The other end of the room is used at noontime for luncheon. The illustration, Fig. 6, shows the lunch room with table set. At the back is the electric cooking apparatus and on the wall the china closet.

The Cellar.

The cellar is a large room with cement floor and walls. The building is heated with hot water. The furnace has a waterback, attached to a seventy-gallon boiler, which supplies hot water for the building.

In summer an instantaneous water heater is used. Compressed air is supplied by a compound air pump (Bishop, Babcock Co.), which pumps air into a sixty-gallon tank set for fifty pounds pressure.

Unfortunately, this description and these illustrations give a wofully



Fig. 6.

inadequate idea of the completeness of this office building. It should be seen, and all who can find the opportunity will be well repaid by visiting Dr. Fones.

Before passing this, there is another aspect that may be just touched on. Undoubtedly many will say, "Only a man of great wealth could indulge in such an office building." The odd thing is that this is no realized air castle of a rich man. This building, luxurious as it is, has been constructed and is managed on purely business principles. Everything is so systematized, invested capital, cost of maintenance and office charges are so harmonized, that Dr. Fones himself is practically rent-free, so much so that nearly all that he does himself is profit. Thus a wonderfully unique, absolutely aseptic, thoroughly professional dental establishment has been proven to be possible along purely business lines.

A Case of Necessity Being the Mother of Invention.

By Dr. Bernard L. Kissel, Joplin, Mo.

On March 3, 1906, the city of Joplin, Mo., was connected up with the natural gas fields of Kansas, and the dentist soon learned that his blow-pipe failed him. It was impossible to get any heat out of natural gas. Right at a time when I was just out of college, and practice was slow, the wolf made frequent trips to the place. My sole asset being time, and having occasional use for a blow-pipe. I studied natural gas and I found that, owing to the increased amount of nitrogen and non-combustible elements interfering with combustion, there must be means applied to a blow-pipe to eliminate these surplus gases, and a chambered hood was devised to do two things, eliminate the non-combustible gas, and retard the velocity of the natural gas, which is under intense pressure.

In an ordinary tip the pressure of the natural gas is so great that the force is sufficient to blow the gas away from the point of ignition, and there is a sheath of gas just at the end of the tube that is not combustible, because it does not have a chance to avail itself of the oxygen in the air, the supporter of combustion, and blows out.

One year later the inlay question came up, and, like quite a few other dentists, I used a tin can and wet asbestos, depending on steam pressure to cast with. The inspiration came to me, if I was using nitrous oxid gas in combination with the natural gas for melting the metal just prior to applying the can, why not use the same nitrous oxid gas, which is under great pressure, to cast with? And here we are, with a universal blow-pipe that will burn either natural or artificial gas successfully and is a direct-pressure casting machine.

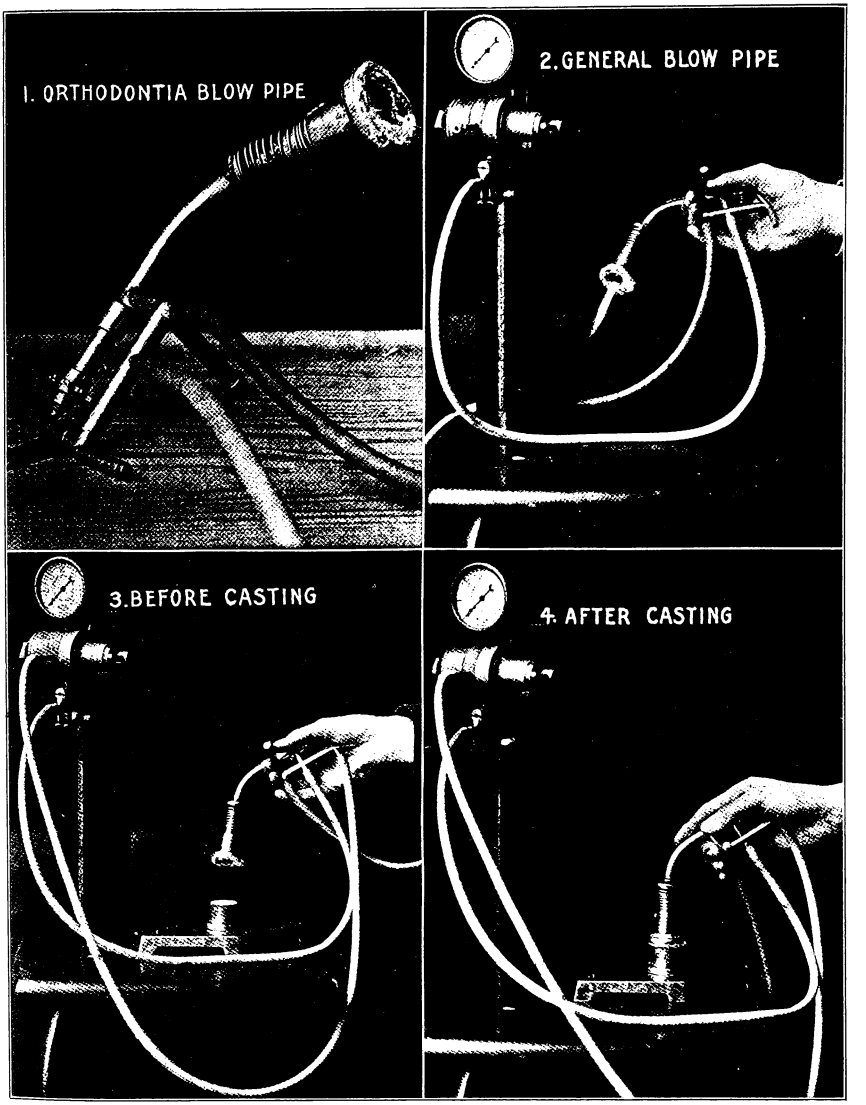
This blow-pipe is adapted for use as an orthodontia blow-pipe, for you can get as mild a flame or as intense a flame as you wish.

Fig. 1. Shows the device as an orthodontia blow-pipe.

Fig. 2. Shows the device as a general blow-pipe.

Fig. 3. Just before casting.

Fig. 4. After casting.


1. ORTHODONTIA BLOW PIPE
2. GENERAL BLOW PIPE
3. BEFORE CASTING
4. AFTER CASTING



President's Address.

Anent Recent Tendencies in Orthodontic Theory and Practice.

By B. E. Lischer, D.M.D., St. Louis.

Read before the American Society of Orthodontists, Chicago, June 30, 1913.

Mr. Vice-President and Members of the American Society of Orthodontists:

For the honor conferred upon me on this occasion I feel deeply grateful. Though conscious of the meager qualifications with which I approach my task, I shall endeavor, nevertheless, to briefly occupy your valuable time with a discussion of sundry recent tendencies in orthodontic theory and practice.

If we seek the cause of progress in human affairs we usually find, for every advance, the resolute activity of some co-worker who has both a knowledge of the past and a vision of the future. But it frequently happens that his angle of vision is not our angle; he occupies, for the moment, a vantage point which many of us have not yet reached, or, perhaps, have already abandoned. This gives birth to a rivalry which, in science, is usually courteous.

Recent orthodontic progress, alas! has not been free from discord. The desire for supremacy among our leaders has added its note of acrimony as well as amity. The battle that has been raging between hostile camps on the orthodontic field has elicited such a flood of articles—many of which display considerable spleen and prejudice—that truth has suf-

fered. And though we willingly admit that these numerous, unremitting attempts to advance the art in various directions have been responsible for the birth of the new order—for many of them contain much that is good—it is evident that the bitterness of the contest has been unnecessarily prolonged. Indeed, the average practitioner takes little interest in this clashing of swords, or at least soon tires of the roar and turmoil, and during reflective moments he very rightly asks: "Have matters been clarified? Are the new teachings sound? May we safely sanctify them by the name of *science?*"

It appears a reasonable undertaking, therefore, to briefly examine our progress, to feel the pulse, as it were, and, if necessary, to apply a little diagnosis. To paraphrase a statement from a recent address by President Jordan, of Stanford University: Orthodontics is now on the firing line of the advance of science. It has left behind it as outworn garments many dental theories, and all schools of orthodontics. Orthodontic advance is the work of no school, the offspring of no preconceived theory.

Causes of Malocclusion.

From time immemorial it has been an ambition of the human mind to know the causes of disease and deformity, twin infirmities of the flesh. Since the days of Fauchard and Lefoulon there has been a continuous effort to discover the causes of the anomalies of dentition. Gradually, and with an increasing appreciation of their importance in prevention as well as cure, investigators have discovered many of the causative factors of oral deformities.

Prior to the days of specialization, when only the general practitioner dabbled in matters orthodontic, the causes of malocclusion were but lightly considered; much teaching concerning them was readily accepted, regardless of its scientific accuracy. Hence the literature of earlier days abounds in many vague and inaccurate statements which, unfortunately, percolated through the sieve of time and served us far longer than their merits justified.

It is not my intention to here enumerate the accepted causes of malocclusion, nor to weary you with those arguments which have shattered or upheld the theories of old. But in this connection, and within the limited confines of this address, it seems eminently appropriate to call your attention to an important tendency of our time, a tendency which even the casual reader of our literature cannot fail to observe. I refer to the proneness on the part of many orthodontists to wholly reject, or at least severely question, the rôle played by heredity in the causation of malocclusion.

We recall the time when heredity explained many otherwise unexplainable phenomena, when it served as a cloak for our ignorance, when many diseases and most deformities were believed to have been transmitted from generation to generation. In those good old days heredity was, in fact, an entity, a force; and probably more frequently for ill than for good.

But the vast extension of our knowledge during the last half century, encompassing an era in science which is now briefly termed *Darwinism,* has forced every science "from geology to psychology to accept what Darwin proclaimed as to biology—the law of development." And in this latter field the application of his method has been nothing short of revolutionary.

One of the most important lessons which we have thus lately been taught is that we no longer "spell heredity with a capital 'h.' We no longer think of it as a power or as a principle, as a fate or as one of the *forces of nature;* we study it as a genetic relation which is sustained by a visible material basis, as a relation of resemblances and differences which can be measured and weighed, or in some way computed."

Much of our recent progress in this department of biology is due to the epoch-making labors of the German investigator, Weismann, of Freiburg. He was the first to call our attention to the fundamental significance of the contrast between germinal variations and bodily modifications. His contentions, that the germ-nuclei are the bearers of heredity; that the germ plasm possesses a continuity not true of somatic cells; that owing to its relative apartness from the everyday metabolism of the body acquired modifications are not transmitted, have been severely questioned, but not disproved.

These are facts of exceeding importance, and we need not wonder that they have finally entered into the discussions in our own field. To the extent, then, that our recent writers stand on this firm scientific groundwork, they stand plumb and true; but let me hasten the suggestion that many of them are out of plumb, and not a few are "opponents of heredity" for no other reason than that it is fashionable so to be. For if their arguments were well grounded in fact they would not indulge in statements as bad as or worse than their heredity precessors.

Of course, this whole movement in opposition to heredity, if I may so express it, has come as a healthy antidote; we were sorely in need of it. But let us not stop there. Indeed, if there is one feature of the etiologic problems that stands out more prominently than the rest, it is this: All dental research thus far conducted is entirely inadequate.

Another phase of this tendency well worthy of note is the underestimation now placed upon clinical data and case histories. The reason

usually assigned for this indifference is that the personal equation enters too largely into such records. That this may occasionally be the case is undoubtedly true; not all investigators have a "passion for veracity." But I ask you to contrast our indifference with the "vast amount of investigation into the laws of inheritance of human traits" now conducted by biologists throughout the scientific world. One need only mention the Department of Experimental Evolution, Cold Spring Harbor, L. I., under the directorship of C. B. Davenport, or the Eugenics Laboratory and its publications, of England, under the able leadership of Karl Pearson, to realize that case histories are quite worth while.

One is reminded here of a statement by Davenport, that "Modern medicine has had its attention too exclusively focussed on germs and conditions of life. It has neglected the personal element that helps determine the course of every disease. It has begotten a wholly impersonal hygiene whose teachings are false in so far as they are laid down as universally applicable. It has forgotten the fundamental fact that all men are created *bound* by their protoplasmic makeup and *unequal* in their powers and responsibilities."

As stated above, I cannot here enter into a detailed discussion of the factors of causation; my aim is merely to call your attention to the general drift of current thought, and how orthodontic opinion is at variance with the best science of to-day.. And finally, I am quite certain that before long we will all admit that various anomalies of dentition *are* transmitted from generation to generation, *e. g.,* anomalies of number, anomalies of form, some anomalies of position (transversion and perversion), as well as abnormal developments of the *frenum labii.*

The intimate relationship existing between dento-facial deformities and abnormalities of the nasal passages and their accessory sinuses are demanding increased consideration. The development of the supporting osseous structures beyond the teeth is thus viewed from the broader standpoint of normal function.

Pickerell is of the opinion that it is difficult to determine, when adenoids and arrested development of the jaws are found associated, which of these is cause and which is effect. Indeed, he is "strongly inclined to the opinion that adenoids are the effect." He maintains that the nutritious foods of to-day lead to an avoidance of mastication, then to narrowed under-developed dental arches, these to mouth-breathing, after which "adenoids develop in the stagnating nasal cavity."

Diagnosis of Malocclusion.

Another very noteworthy tendency of present-day theory and practice is our attitude toward the problems of diagnosis. In these days of the "systems," with their truly remarkable achievements in

technique, we are prone to rest content with our superficial calculations—for we love to cling to seeming bounds. Hence a discussion of our shortcomings and difficulties is frequently looked upon as a needless disturbance of a fairly satisfactory routine.

How unfortunate it is that so many cases of malocclusion are complex; that several and various deviations from normality so frequently conjoin in a single case. But bewail the fact as we may, it is our duty to discover and work out in detail the morbid anatomy of every type of dento-facial deformity. And in doing so, we must exhibit a liberalism that characterizes all true science.

In a previous communication the historical development and fundamental considerations of this subject were set forth. The importance of a careful differentiation between basic pathological conditions and superficial symptoms were thus emphasized. The need for an improvement in nomenclature was not only pointed out, but a group of terms was actually proposed. Continued use of these terms in practice and teaching by several friends and co-workers has not only re-enforced our faith in their practicability, but has extended our perception of hitherto unrecognized abnormalities which enter into malocclusions. Thus malposition of the mandible (Federspiel), which previously was unknown, is now regarded as a factor of great significance in distocclusions and mesiocclusions which have passed beyond the developmental period.

Facial Deformity.

But one of the most significant phases of the subject of diagnosis which, it seems to me, has not yet received the attention which its importance demands, is that of facial deformity. Thus far we have had but two fundamental contributions on the subject, and, strange as it may seem, they are diametrically opposed to one another. Thus, on the one hand, we are taught the supreme importance of the full complement of teeth and the imperious hypothesis of ideal occlusion. Accordingly, the outward form of the changeable area of the face is dependent upon the relative normality of the denture within; and that, as a rule, it is best to establish normal occlusion and thus strike a balance of the features which is rarely, if ever, wrong.

On the other hand, it is proclaimed with equal emphasis that the full complement of teeth is not necessary in the treatment of certain types of malocclusion; in some instances extraction of one or more teeth is positively indicated. The operator's ideal of facial form is the criterion we are thus asked to accept. It is presumed, of course, that this be a cultivated ideal, carrying with it that fine discretionary ability to say when teeth shall be extracted, or moved bodily, for the improvement of facial balance.

I need not further expound the arguments of either view here; they are familiar to all. I wish merely to direct your attention to several involved problems which are of the greatest moment, but which are rarely mentioned.

Did it ever occur to you that the former view, though a strong crutch to lean on, is dangerously orthodox? Are our tasks really as simple as this arbitrary faith thus proclaims them to be? It is good practice to treat every case according to the fixed routine thus implied, and to mislead our patients and their parents, as well as ourselves, into the belief that ultimately a normal facial expression will obtain, no matter at what age the treatment be instituted? Will a restored occlusion always promote growth of short, thin, upper lips, and diminution in size of enlarged lower lips? Is occlusion a therapeutic agent of such marvelous power that deficiency or redundancy of the symphysis, malrelations between the occlusal plane and aperture (*rima oris*) malformations of the jaws and malposition of the mandible, will all finally be corrected by it? These are problems of compelling interest and merit painstaking investigation.

Difficulties of Prognosis.

During the last decade we have witnessed the development of another very important aspect of orthodontics. Though it has for some time been recognized that oral deformities develop gradually, it is only in recent years that the various stages of these maldevelopments have been made a subject of *careful comparative study.*

Just as the physician laboriously observes and records the onset, course and termination of every disease, and finally portrays a clinical picture of each as the sum of all its symptoms or manifestations, so the orthodontist now observes and records the various developmental stages and accompanying deviations of every type of malocclusion. For the first time in the history of our art we seem to fully realize the importance of an early diagnosis; we are now convinced that years before even an intelligent parent recognizes the impending deformity, the alert diagnostician can advise ways and means for its prevention.

Thus slowly, but surely, are we establishing the axiom: *malocclusion and its accompanying deformities are progressive, not static.* In short, the prognosis of malocclusion is equally as unfavorable as that of caries of the enamel; its evil consequences are equally certain. The one great lesson which our recent progress therefore emphasizes is this appreciation of the *evolution of types.* To detect them in their incipiency, to early foresee their ultimate terminations, and to divert the underlying forces into channels of normality—this is one of the highest missions of orthodontics.

Appliances for Orthodontic Treatment.

Our recent literature bears ample testimony of a very substantial progress in the treatment of malocclusion. This is very gratifying, for next to the acquisition of knowledge should come its application.

One of the best evidences that we have entirely discarded the narrow yet popular views of a decade ago is the large variety of appliances now on the market. The ingenuity of many workers and the various difficulties inevitably encountered in the treatment of malocclusion were destined, sooner or later, to promote this advance. The restrictions formerly imposed by the so-called *systems* (such as limiting oneself to one kind of appliances) have finally been repudiated.

Every progressive practitioner seems now to have adjusted himself to the new régime which bids him to use manufactured appliances; it furnishes the necessary leisure for mastering the principles involved in their use, as well as the details of their application. All honor to the men who prophesied, as well as demonstrated, the wisdom of this new departure. The recent triumphs of their far-seeing judgment ought to fill the hearts of those who still labor among us with supreme satisfaction. Thus to have benefitted distant others is the highest reward it is man's privilege to receive.

The bitter struggle which the systems engendered is now viewed as a passing cloud upon the horizon—for systems are wholly foreign to the democracy of science. Hence, the thought that they must finally die, that upon their shattered dreams of approximate finality a greater art will rise, is encouraging, and not at all dispiriting. Indeed, this forward movement has now begun. And the core of this new movement consists, I think, in the comprehension of the importance of a differential diagnosis, the designing of a definite treatment for each type of malocclusion so comprehended, and the mastery and simplification of every such definite treatment.

Improvements in the technical details of treatment will, doubtless, continue to be made; we have not yet reached perfection. But while we thus rejoice in some notable achievements, a becoming modesty is still quite in order when we meditate over the unsolved problems of post-treatment maintenance. Full many a sail of premature enthusiasm has been wrecked on this rocky shore. Thanks to several devoted members of this society, a large part of its cold and forbidding frontier now stands illumined as a result of their untiring labors.

The literature of the last year also bears evidence of an extended acceptance of Dr. Case's contention in favor of the *bodily movement* of teeth. That the new (?) reasons and mechanisms proposed for its accomplishment differ from those of Dr. Case is not of very great moment;

the point which must chiefly interest us here is, that men high in authority and of unquestioned ability now find it advantageous.

Extending the Orthodontic Field.

The necessity for the early treatment of malocclusion, and the benefits thus bestowed upon growing children have abundantly been set forth in recent years. The probable incidence of oral deformities (about 50% of all children) has likewise been intimated in the numerous reports of mouth hygiene committees throughout our land. The appalling discoveries of the frequency of dental caries and oral sepsis have well-nigh blasted the hopes of many conscientious workers in the ranks of this very vital movement. Several of the best-informed leaders have admitted, perhaps reluctantly, that to provide the indicated treatment for the residents of New York City alone would require the services of every dentist in the United States for an indefinite period.

When we ponder these facts we are impressed with the utter inadequacy of all artificial means at our command for combating this grave affliction of the race. But the great work of Pickerell (*Prevention of Dental Caries and Oral Sepsis*) marks the beginning of a new epoch in the science and art of dentistry, and lays the foundation upon which a rational mouth hygiene propaganda must stand.

But what of the children who are afflicted with oral deformities? Would it not require the services of all orthodontists of the civilized world to treat only the more serious cases in Chicago, or St. Louis? And now that we no longer emphasize the esthetic results of treatment, but proudly boast of physiological consequences, of improvements to the child's health, what have we done, what are we doing, to materially extend the field of orthodontics?

Individually we can accomplish practically nothing; collectively we may accomplish a great deal. To go at once to the heart of the matter, I maintain that it is both an economic and an educational problem. Indeed, most of the problems which vex modern society and which demand correction are economic in their nature. As Lester F. Ward puts it: "It has become more and more apparent that improvement cannot be secured through the increase of knowledge, *but only through its socialization.*"

I am not unmindful of the many unsolved problems of orthodontics, of the need for an increase of our knowledge. But a fact which needs a wider publicity is, that our present knowledge is already so extensive that a vast good could be accomplished if it were more liberally appropriated by society at large. There are those who are sanguine enough to believe that if orthodontic art deserves extended application, a demand

for it will speedily follow. But there are many reasons why this much needed extension of the field of orthodontics is difficult, why it merits a well-organized propaganda, though I mention but two.

First, the economic factor. Fully 80% of the population is financially unable to pay for orthodontic services: and inability to pay implies a denial of that leisure so essential to its appreciation. Numerous statistics might here be introduced in substantiation of the above. Briefly, the remedy lies in a more equitable distribution of wealth.

Second, it is an educational problem. This embraces the lack of culture of the masses already referred to (for which they are in no way to blame), and the lack of facilities afforded the profession for the acquirement of special orthodontic training. There is only one way by which the latter can be corrected, viz., by a large increase in the number of high-class schools where this special training may be acquired.

If orthodontics is the curative art it is represented to be, if the correction of oral deformities is so essential to the health and well-being, as well as beauty, of children—and I firmly believe that it is—then it is a solemn duty of the State and its institutions of higher learning to liberally provide every opportunity and facility to all who seek instruction in this branch of the healing art. And the kind of instruction I have in mind would not consist of a few dry lectures on the theory of orthodontics, such as we still find in many dental schools. Orthodontics (in fact, every dental subject) merits the same facilities, rank and discipline as are now accorded most of the subjects taught in our best university medical schools. This would require, among other things, so-called full-time professors, specially designed clinical lecture rooms and laboratories, etc. Such departments should be open throughout the entire year, both for the benefit of the patients applying for treatment, and for the graduate students in attendance. Large State and private funds will be necessary for financing such institutions; and it is a duty of this society to prepare appropriate resolutions calling the attention of our universities to this worthy cause.

In conclusion, I plead for a more liberal interpretation, not only of past achievements, but of the problems immediately confronting us. I repeat: Orthodontics has left behind it as outworn garments many dental theories and all schools of orthodontics. Orthodontic advance is the work of no school, the offspring of no preconceived theory. Like every other art worthy of devotion, it knows neither country, creed nor race. It gladly accepts the only true test of every human enterprise, business, or profession, viz., *the service which it renders to mankind.*

The Twentiety Century, now well on its way, has given birth to a new *social conscience,* and attaches a social significance to all the deeds of

men. The older forms of righteousness, though fundamental concepts of a highly individualistic ethical philosophy and worshipped as ultimate ends of ethical attainment, "have almost become automatic to a majority of the community."

Social ethics, the very life-blood of a democracy, without which it cannot endure, demand an extension of all previous codes. Privilege or profit, any undue advantage at the expense of one's colleagues, in whatever form, are alike censurable and anti-professional. Rightly conceived, every new achievement of the human mind is but a gleam of the glory that is yet to be, the forerunner of yet higher achievement. The rich heritage bequeathed to us by the pioneers constitutes a debt we can only pay by extending its boundaries, and by making it equally accessible to all.

"To have sown in the souls of men
One thought that will not die—
To have been a link in the chain of life—
Shall be immortality."

Edwin Hatch.

Discussion of President Lischer's Address.

Dr. Chas. R. Jackson, Indianapolis, Ind.

We have enjoyed this most excellent address, and there will be more pleasure in store for us when it is in print and we shall be able to read it carefully and digest it. I am so fully in accord with most of what the author has said that I shall consume very little of your time in discussion.

I am glad to hear Dr. Lischer express his sentiments in regard to eugenics. I have never been able to accept the extreme ideas of the anti-inheritance enthusiasts. However, extremes seem to be necessary for advancement in any line, and instead now of attributing everything to inheritance, I think it is only a question of time when we will come back to the more tenable position of our scientists, who tell us that acquired characteristics are never transmitted.

And yet those of you who have read the wonderful experiments of Luther Burbank cannot help but be struck with the fact that not only may these acquired tendencies be transmitted, but they usually are transmitted. if that be true in the vegetable kingdom, why is it not true in the animal kingdom? The thought has occurred to me in the progress and study of eugenics, may it not be possible in a decade or so to carry out experiments along the lines similar to those carried out by Burbank. as applied to the human being, such as selective breeding of the human being. The idea may seem very extreme, but when we think of the wonderful benefit

it will be to humanity to learn something about heredity, or whether there is anything in it, it certainly seems worth while. We study everything under the sun except the human, and the human race seems to take care of itself.

In regard to the causes of malocclusion, we have many things to learn before we shall be able to diagnose many of the cases of malocclusion that come to us, and we cannot do it by theory, nor by reports of a limited number of cases. Deductions from one or two cases do not prove anything. Deductions from five hundred cases would give us a basis for a theory that would be worth while.

In regard to failure of development of the normal facial expression following treatment, without extraction, I certainly disagree with the essayist. We all admit, I think, that we have cases in which we do not seemingly have normal development and normal facial expression following treatment where the teeth are left in position, but these are the extreme or exceptional cases. There are many cases in which nature has blessed the individual with normal occlusion, with normal teeth in position, and still we do not have ideal facial contour and ideal facial expression. Why, then, should we expect it in every case we treat? The old adage is "the exception proves the rule."

Mouth deformities and how best to correct them presents a great problem, as the essayist has said. We must also think of what we are going to do for those poor patients who present to us and need treatment, just as we do of patients who come to us for the correction of deformities and are able to pay to have the treatment carried out. I refer particularly to the cases that come to the college clinic, and those of you who have college clinics in orthodontia realize that these cases need some attention, and that some other method is necessary to deal with them. There is a crying need for some change. While admitting that assistants would really be beneficial, still I doubt whether the time is ripe at present for the resolutions that our President has suggested to be presented to State legislatures to carry out this plan. Are we not too young? Does the legislature appreciate the value of our services sufficiently? In other words, should we not carry on an educational program to a greater extent before a resolution of this sort would have the effect which we desire?

I cannot even argue with the author in regard to the sociologic part of his paper, in which he says that one of the solutions of this difficulty would be a more equitable distribution of wealth. It would be a grand solution, and I would like to come back to this earth in a hundred or so years; although it is pleasant enough to live now it would be more pleasant when it is rearranged socially.

I commend the President's address, not only for the sentiments he has expressed, but on account of the pleasure I have had in listening to his reading of it.

Dr. C. A. Hawley, Washington, D. C.

In the address of our President, which I have been requested to discuss, we find very much to commend and little to criticize. He broadly and courageously deals with the problems which he selects as most important to bring before this body, and what I have to say will be in the direction of further elaboration of these topics.

In regard to the writings of the past, which he mentions that have been at times possibly of a somewhat acrid character, I will only say in comment that we hope and believe that this society has developed into an arena where any and all questions concerning orthodontia can be discussed broadly as scientific problems, absolutely without personality and without references to previous differences. In other words, we believe that this society is and will be a clearing house if we might so term it, for all persons vitally interested in the science of orthodontia of whatever so-called school.

In regard to the remarks on the present attitude toward the question of the influence of heredity and relation between nasal and mouth conditions, I am able to add nothing to his discussion, which I believe is admirably stated.

In regard to the Angle classification and its possible limitations in not regarding the relation of the face to the denture, I agree with him practically, but it perhaps might be stated in another way. To the general proposition that occlusion is "the basis of orthodontia" no one in this society will disagree. It is not a religion, but a scientific fact. The most earnest claimant that the face must be taken into consideration in classification limits such cases to a very low number and when past a certain age. In all cases in the developing stage there seems to be no disagreement. These cases then must be considered individually and are fruitful subjects for discussion.

But, as the author says, occlusion is a principle, not a dogma nor a religion. I think every orthodontist of experience knows that there are cases that must have what we would call "compromise treatment." Even if all the teeth are present there are cases where an ideal occlusion cannot be obtained. And as a result of some observation I am unable to maintain that the teeth are *always* adapted in size to the individual. The relation of the face to the denture is a question of the individual case and should be so studied and treated. And "normal occlusion" does not by any means solve all our problems.

The author's statement that all malocclusions are progressive cannot in my opinion be controverted.

In another division of his address he discusses one of the gravest problems confronting the orthodontists to-day—the problem of extending our work to the masses of people and the education of specialists. As to the former, if the problem of the simple hygiene of the mouth has grown to such dimensions as to practically stagger the resources of its promoters, what hope is there in view of the well-known obstacles for the wholesale treatment of malocclusion for the masses of people?

I would venture the opinion that the solution is not along that line. Malocclusion of the teeth is unquestionably a preventable condition, and the best work in prevention will likely be found along the line of their normal and vigorous use. If the work of the Research Committee of the N. D. A. is successful, and a fund is established, this society should ask that the work in this direction be started as soon as practicable. Some work has already been done by individuals, and this should be enlarged and simplified until conclusive results be obtained. They would not probably be obtained in this generation, but should be started as soon as practicable.

To the second question, the educational problem, I do not intend to offer a solution, but we know that the colleges are already calling to us for advice, and we also know that the facilities for teaching orthodontia are not adequate.

The requirements for entrance into the field of orthodontia as specialists are not the same to-day as they were ten years ago, nor is the opportunity the same, but this growing requirement has not been met by any school, so far as I know.

In conclusion, while commending the address as broad, able and scholarly, I would not feel that I had done my duty if I did not add one note of criticism. While not wishing to discuss at this time the merits of the President's new terminology, I cannot refrain from suggesting that the word "orthodontia" is still officially recognized in our literature, and that until the society officially repudiates this term it should be used in such communications as a President's address. No doubt our nomenclature is faulty in some respects and needs revision, but until it is officially revised, the recognized nomenclature of the science should be used in papers before this society.

Dr. Allen B. Suggett, San Francisco.

The President speaks of "orthodontic progress not being free from discord" and of the "desire for supremacy."

Such feelings are frequently followed by an introspection, the resultant impulse being to determine whether the in-

dividual is making the best effort and whether such effort is in the best interests of mankind: the desire to improve usually follows. This may well apply to schools.

"Orthodontic advance is the work of no school," yet the stimulus of the work of one school (collectively speaking), whatever the policies of its adherents, will in a measure broaden the view of orthodontia in other men's minds, with the result that their teachings and practice will be modified to conform to the most advanced orthodontic procedure.

With this thought in mind and realizing the need for spreading a general knowledge of orthodontia, the pedagogic method in practice in the University of California a few years ago, whereby students were taught only the fundamental principles, taught how to diagnose and classify a case, and taught to refer the case to the orthodontist, has been eliminated.

A full course in orthodontia technic has been in vogue for many years, and it is now augmented by requiring each senior student to carry to completion at least one clinical case.

The fact that men who practice orthodontia exclusively, confine their efforts to large cities, justifies the latter policy, for the people in smaller communities are equally entitled to such privileges and are equally well able to pay for them.

University Dental Schools should offer the best educational facilities in this subject, just as they do in agriculture or engineering. Subsequent to this, individual effort and associational opportunity are the most desirable ethical means for progress.

The desire on the part of the dental profession to better equip itself for work, manifested in the attendance upon classes of instruction in prosthesis, analgesia, pyorrhea, etc., particularly when such classes are instituted or promoted by manufacturing concerns, indicates the necessity for offering instruction in all advanced dental thought, concentrated, if you please, through the medium of the universities.

The University of California proposes such a measure, to follow the winter holidays, to be given to the profession of the State without expense.

It is peculiar that the orthodontists should have obtained statistics as to the prevalence of cases of malocclusion from investigations in the mouth hygiene movement. That such reports have been accepted and commented on by the President brings to light a new phase in orthodontia, and that is, as one of three important factors in the prevention of dental caries, the other two being mouth hygiene and regulation of the diet. Pickerell's researches on the latter subject are deserving of thorough study by members of every branch of medical science.

I want to emphasize the point that if orthodontia is as important as we think it is, if it increases the masticating surface, thus assisting the stomach, developing the bones of the face, increasing balance, symmetry and beauty, correcting abnormal breathing and increasing the supply of blood to the brain—if this be true, we have indeed a solemn duty to discharge to society. Are we doing as much as dentistry or medicine to extend those great benefits to society? New York and Chicago have dentists and physicians running into the thousands, but they have about a dozen orthodontists to meet such a crying need of two or three million people, for it is estimated that nearly fifty per cent. of the children are suffering from malocclusion. Some States have not one orthodontist. The Republic of Mexico has only Dr. Rojo to save it from becoming a nation of mouth breathers.

The laymen might logically doubt that orthodontia is so important when they see the lack of facilities which we have for teaching it. They would either come to that conclusion, or decide that we had not yet developed to that degree of broadness where we would welcome new recruits into our ranks. There was a time when medicine had the same attitude, and dentistry had it until an even later date.

When I was in college I used to shudder when I read in *The Cosmos* the list of graduates from the different colleges. The recent graduate would not be expected to take the broad view of questions that he would later on. However, we expected more of orthodontists because most of them have had several years of general practice and should be far from falling into the narrow groove that those before them fell into. We see the great need of more competent orthodontists. The university is the natural place to go for that training. The real university invites the farmer, the horticulturist, the stock breeder, the chemist, the biologist, to come and accept the assistance there offered. Instead of dentists paying a big fee for any special training to some traveling specialist, it ought to be possible to get it at the university. There should be a fund by which we could induce any man who has become an authority on any phase of dentistry to come to the university and give a course of clinics or lectures under favorable conditions. We are gathering a vast amount of information, but we are not offering facilities for applying the benefits of that knowledge to society.

If "service to humankind" is our object, then the means of providing treatment for the eighty per cent. of the population mentioned in the address must receive some attention at our hands.

Where a paternal form of government exists, as on the continent, more consideration is shown for the health and welfare of the people

who constitute this larger percentage than in this country where the expression of the will of the people is supreme.

Since it is impossible for the present number of orthodontists to render such service, the importance of our work justifies our using every ethical means to provide it; three methods suggest themselves to me: 1. By advocating the practice of orthodontia as a learned profession for men and women. 2. By securing endowments for the establishment of orthodontic dispensaries. 3. By securing a broader recognition of the subject and encouraging better teaching facilities, making it a major subject in the dental schools.

The President's recommendation that we bring all these facts to the attention of the universities is indeed worthy of commendation.

It will not be long before the leading university dental schools will be demanding two years of academic training for admission. This approximates the admission requirements in medicine, with biology, chemistry and physics, as the underlying essentials to the basic subjects in medicine, anatomy, physiology and pathology, all taught in common to students in medicine and dentistry. The field of special study in medical science will add oral surgery and orthodontia to those already well-established divisions, as rhinology and otology.

Thus may our ranks be re-enforced and a greater work in preventive medicine accomplished in justice to the children.

Dr. J. Lowe Young, New York City. I am not going to try to discuss the President's address, because I believe it requires careful reading before an attempt should be made to discuss it; but I wish to call attention to one thing Dr. Hawley said which, I am inclined to believe, will create a wrong impression. I think I know Dr. Hawley well enough to feel that he did not mean to leave the impression on this society that, I am sure, his remarks will leave if they are published. He said that he is convinced that there are cases of inharmony of the upper and lower teeth which make it impossible to bring about normal occlusion without the extraction of a tooth. I do not believe Dr. Hawley will come before us and say that when he has removed a tooth he can accomplish normal occlusion in that kind of case.

Dr. Hawley. It would depend upon your definition of normal occlusion.

Dr. Young. Let me make myself clear. Do you wish to leave the impression on this society that you have seen cases where, after a conscientious effort to establish normal occlusion, you could not do it without removing a tooth from either dental arch? That by extracting you could place the teeth in a more harmonious relation than they were in after your best efforts with all the teeth?

Dr. Hawley. Not to leave a wrong impression, I want to explain these cases. There were two cases brought to me in which the operator, so far as he could see, found it impossible to get any overbite whatever. I studied these cases, and in one of them particularly the mesio-distal widths of the upper teeth from molar to molar was measured, and the mesio-distal widths from molar to molar in the lower also, and the combined mesio-distal widths of the lower teeth were as much greater than the upper, as the upper ordinarily is greater than the lower. In other words, you could not get an overbite without removing one lower incisor. Whether you call that obtaining occlusion or not, I do not know.

Dr. Young. What is the age of the patient?

Dr. Hawley. The teeth were all erupted; the second molars were all in place. I cannot get casts at the present time, but I can get them later. There are conditions similar to that which I have seen, but not so pronounced. In extracting the lower incisor and getting an overbite, I do not know whether you would call that obtaining normal occlusion or not. You could not get normal occlusion without doing that.

Dr. Young. It is said that we must have an overbite in every normal occlusion.

Dr. Hawley. Would you leave a case with the lower incisors extending beyond the upper?

Dr. Young. I have a case in which the central incisors are at fault. I have worked on the case for five years, and I have not obtained an overbite. But I honestly believe that if that case had been taken early enough in life that condition could not have prevailed to-day.

Dr. Hawley. You did not change the width of the teeth?

Dr. Young. There is a disparity in the mesio-distal diameters of the bicuspids and molars. The mesio-distal diameters of the lower biscupids and molars is too great to harmonize with the upper so that there would be an overbite.

Dr. Hawley. How much of an overbite?

Dr. Young. He never had any. There are many cases that never have an overbite.

Dr. Ottolengui. You mean an overbite in the incisor region. There is an overbite in the molar region, is there not?

Dr. Young. That was the point, and this question of treatment of malocclusion, in my judgment, is a question of a handicap. If we allow children to go along until the dental arches may overdevelop, and start in with a pronounced

malocclusion, we cannot get ideal results. There may be cases in which extraction is necessary, but let us start to treat these cases earlier. Let us get them at three and a half years of age, recognize them and begin treatment. I do not believe in extraction of teeth unless it is very essential to do so, and I believe normal occlusion is a basic principle in our treatment.

Dr. Ottolengui. I do not think Dr. Young, although he said he did, understood Dr. Hawley. Ordinarily the sum of the mesio-distal widths of the teeth in the lower arch should be such a total that when they are placed in the upper arch the distal surfaces of the lower molars and upper molars will be about in the same vertical plane. Is that correct?

Dr. Hawley. Practically so, not accurately.

Dr. Ottolengui. The sum of the mesio-distal widths in the lower arch in Dr. Hawley's case seemed greater than in the upper arch, so that it could not be brought within the arch of the upper. I do not see what difference it would have made if treatment had been begun at four years of age, as no amount of orthodontic treatment could alter the widths of the permanent teeth. I have never seen cases like Dr. Hawley's, and if he could give us a better description of them, with casts, and the actual measurements, it would be appreciated. I see Dr. Hawley's point exactly. On account of excessive widths of the lower teeth his diagnosis made it necessary to remove a lower central incisor. The patient would never have normal occlusion of all thirty-two teeth, but probably could be provided with normal occlusion of the bicuspids and molars.

Dr. U. B. Jackon, New York. I would like to make a few remarks on the President's address. First, I want to say it is on broad lines, and he has set an example for us which, I think, will go down in history.

I am very much interested in heredity. I have read Davenport's work and have gone through the scientific list, so far as possible, and I do not want the gentlemen here to think that they do not want their offspring to represent their parents. In other words, we have to consider whether we shall make heredity a dominant factor without changing the meaning of the word.

I fully appreciate the views expressed by your President.

With regard to the matter of progress in our work, our work will depend upon keeping ourselves abreast of scientific progress. We must be willing to discuss the matters before us, and present our views with all our hearts and honesty of purpose. If we work in that channel we

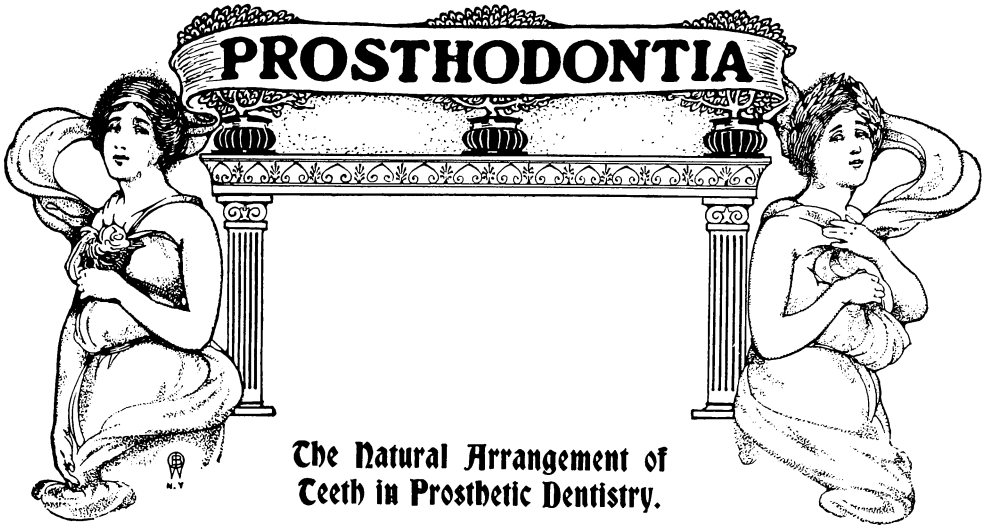
will have one of the greatest specialties not only in dentistry, but for many years in medicine, but much will depend upon ourselves whether we take the stand that we are medical specialists. I have for many years advocated that, and in that way we should stand pretty close to the rhinologists and laryngologists, discuss these subjects with them and work with them.

Dr. Lischer. (Closing the discussion.) I do not want to detain you very long; I wish merely to express my appreciation of the many kind things that have been said this morning, and to refer to one or two points. First, the education of the orthodontist. You will all agree with me when I say that orthodontics is just as important a specialty as otology, rhinology, pathology, or any other 'ology'; and if the universities are fit to teach one they can teach all. I wish to point out that it is the function of the university, if it teaches pathology, opthalmology, or otology, to teach orthodontics. It is worthy of university recognition. That is the point I make. I think our specialty is worthy of university recognition, and I did not mean by what I said about reaching the masses that we are going to reform society all at once. I am not that much of a dreamer. We owe it to society that we should stand on both feet and demand that these schools recognize this particular field in the healing art.

You cannot send a child to a clinic and hope to get results. I have been a teacher for thirteen years, and I know what they are doing in the schools; they are doing the best they can with the funds they have. It is a question of funds. You cannot make me believe that a man cannot teach orthodontics as it ought to be taught in a university. You might as well say he cannot teach gynecology and obstetrics, yet it is being done satisfactorily. The way to promote science and art is to get them out into the open, free air. That is why I think the universities owe it to us. We ought to appeal to them to take this matter up.

As to the technical questions discussed here, I do not want to enter into them because, important as they are, the point I really tried to bring out was this: with ideal occlusion of the teeth established, with the best results you can obtain, there is still a distant variation in patients of the same age and type of oral deformity. There is a noticeable variation in the facial deformities, and we have not in the past carefully analyzed these. We are ripe for a classification of facial deformities exclusive of the occlusal defects that belong to this or that type of malocclusion. We have not analyzed them in detail. Dr. Case is the only man who has intimated that such a thing exists, though he has not been very comprehensive; and I think that with all due deference to Dr. Case.

Gentlemen, I thank you for the manner in which you have received my address.



The Natural Arrangement of Teeth in Prosthetic Dentistry.

By Ellison Hillyer, D.D.S., Sc.D.

Read before the Central Dental Association of Northern New Jersey, April, 1913.

Prosthetic dentistry to-day presents three predominant problems, the solution of which is absorbing the minds of many of our most earnest thinkers and experimenters, whose efforts have already been crowned with success to a greater or less degree.

First, anatomical articulation; second, improvement and development of methods of crowning roots and bridging spaces, and third, the natural arrangement of teeth for both full and partial restorations.

Were these three problems solved and the deductions applied by the profession at large, many of the causes of present dissatisfaction would disappear. That such a solution will ultimately be reached I have no doubt, and all that is done to hasten the desired result will be welcomed by us all.

It is not my purpose to deal with either of the first two subjects, as each requires special consideration. In naming the third "The Natural Arrangement of Teeth" (rather than the "artistic") I have desired to lay stress upon the restoration of the lost parts to a *natural* condition rather than to create an impression of a merely *artistic* specimen of workmanship. The terms should be synonymous, inasmuch as art is described as "The holding, as it were, the mirror up to nature."

A close observer of the average prosthetic operation sees many points to criticize. In partial dentures there are several essentials to be observed in correctly restoring lost parts.

Matching Color of Teeth.

First, the base should be firm, properly constructed and placed in position; second, the shape, size and color of the teeth restored should be carefully considered. There should enter into the selection the consideration of the adjacent natural teeth and alveolar ridges. Conditions within the oral cavity produce many shades in the teeth in various parts of the arch. There may be as many as eight different tones. The central and the lateral incisors are not always exactly of the same shade. The density of the structure of the cuspids renders them darker than the incisors; the bicuspids are so prone to be affected by carious inroads that very often they present several shades radically different from the teeth anterior. The molars, due to the forces of mastication, are liable to discoloration and abrasion—presenting a variety of shades.

In replacing, for example, a lost lateral incisor, it is necessary to select a tooth which does not exactly match either the central or the cuspid but one which will be of such a tone that it will blend the shades of both central and cuspid and not stand out conspicuously by a decided contrast with either adjacent tooth. This blending of color holds good in any part of the arch.

Size and Shape of Artificial Teeth.

Many unnatural restorations may be seen that are not due to the matter of color. Where individual teeth are to be replaced, the spaces are often contracted or widened, depending upon the condition of the occlusion of the remaining teeth in the arch. In a most excellent paper by Dr. Weston A. Price, read at the meeting of The New York State Dental Society in May, 1911, and published in *The Dental Cosmos* in August of the same year, Dr. Price shows how, in many cases, the spaces may be orthodontically corrected to a normal, or fairly normal relation before prosthetic restoration is made. This is not always feasible and we are obliged, in many cases, to accept conditions as they exist. When the space of a lost incisor is contracted it is much better to match, as far as possible, its fellow of the opposite side in every respect, even though a position of torsion be the result. A tooth ground mesially and distally, in order to fit it into a space, produces an appearance which, in many cases, is in no sense a natural one. Where the space is widened it is better to insert a tooth of natural size, allowing spaces to exist mesially and distally, if necessary. The use of a large tooth to close a space is one of the most unnatural restorations that can be made.

Where considerable absorption of the alveolar process has occurred either a gum section tooth should be selected or a long plain tooth should be so shaped as to give it the appearance of having a denuded

neck. If a gum section is chosen, care should be exercised to make the gingival border of the porcelain tooth join with the gingival border of the adjacent natural teeth. The gum portion should be ground to a feather edge and set upon the cast in such a manner, by carving the cast, that it will, when inserted in the arch, sink into the mucous membrane surface, restoring the parts to normal contour. (Fig. 1.)

The preparation of a plain tooth for a similar case involves the

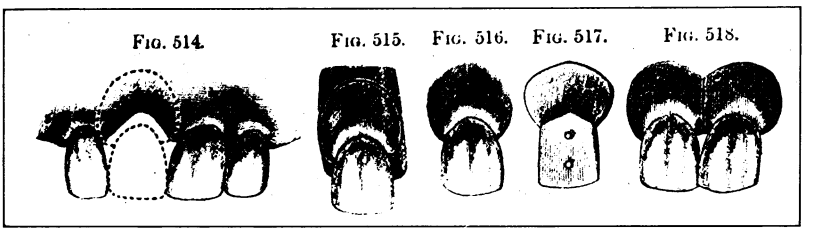


Fig. 1.

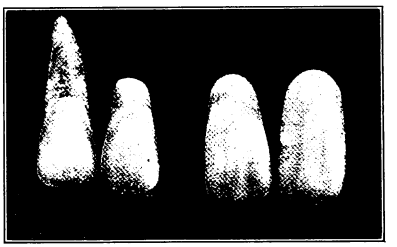


Fig. 2.

selection of a tooth considerably larger than required. This should be ground to shape as indicated in Fig. 2. The neck portion, if polished with sandpaper disks, will soon take on the natural appearance of denuded natural teeth due to the action of the oral secretions.

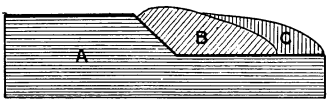
Hand Carved Teeth.

Dr. C. K. Buell, of Buffalo, N. Y., has given the profession a most excellent method of making individually characteristic teeth—or considerable number if necessary—to supply these cases.

He uses a plaster base (Fig. 3, A) shaped about one-sixth larger than the desired size of the tooth to be carved. This is given the form (Fig. 4) to afford the ridge lap portion; provision is made for the reception of

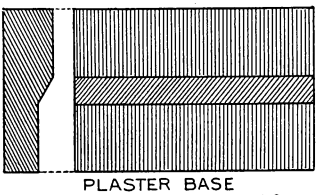
either a pin (Fig. 5, G. H.) or a slot (Fig. 5, C. D.). The plaster core is then coated with shellac. The body is placed upon the dried shellac surface (Fig. 3) to the outline of the marks indicated in Fig. 5 and then fused. High fusing porcelain will give most satisfactory results and the carving will make it possible to produce any peculiarities desired in a given case.

This individual treatment should be followed where more than one tooth is missing. A case of this kind came to my attention a few weeks ago. A patient afflicted with pyorrhea presented for treatment, which



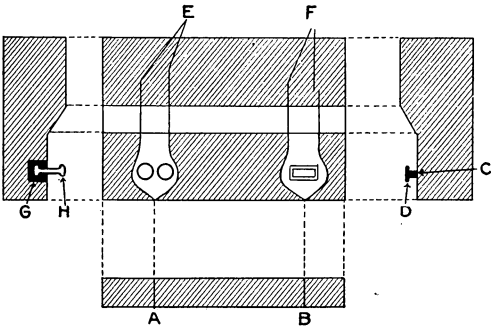
A-PLASTER BASE
B-YELLOW PORCELAIN
C-BLUE OR GREY
HEAVY LINE-SHELLAC

Fig. 3.



PLASTER BASE
COATED WITH SHELLAC

Fig. 4.



A & B-LINES INDICATING THE POINT OF THE INCISIVE END
C-PLASTER CORE TO FORM SLOT
D-WAX FLANGE FORMING GROOVE
E & F PENCIL LINES TO INDICATE POSITION OF CERVICAL END
G-WAX IN LARGE HOLE TO HOLD PLATINUM PIN
H-PLATINUM PIN

Fig. 5.

included the replacement of several teeth in the upper and lower arches. The lower denture she was wearing carried three lower incisors where but two had been lost. The appearance was that of a space closed with porcelain, self-evidently artificial. The denture she now wears carries but two incisors shaped and stained to match her own incisors, and are placed unevenly and separated in such a manner that none but the closest inspection can detect the restoration.

Staining to Reproduce Natural Defects.

The introduction of individual characteristics may be accomplished by staining in addition to the shaping. The change in color may be made by addition of porcelain enamels or by the application of mineral stains. The various checks, lines, pittings and ridges found in many teeth may be easily simulated. The marks of imperfect development due to diseases contracted in early life or inherited may be closely followed.

While it is not implied that an edentulous case would be wisely restored by reproducing exaggerated conditions, many cases occur where such faulty natural teeth are present, and where a perfect porcelain tooth used to replace a lost tooth would be entirely incongruous.

Influence of Temperament.

The natural restoration of edentulous cases demands a thorough appreciation of the subject of temperaments.

The classification, laid down so elaborately many years ago by Dr. Flagg, has been of great service to all students



Fig. 6.

of the subject and has given us at least a foundation upon which to build our conceptions of what a given case requires. The four basal temperaments, the sanguineous, bilious, nervous and lymphatic, while seldom found as pure types are evident in every individual—usually in combination of two types, sometimes of three. The determination of the temperament furnishes a safe guide for the selection of shape and color of tooth to be used.

Some years ago, Dr. Berry, of Milwaukee, in discussing this subject before the National Institute of Dental Pedagogics, suggested a useful method of selecting a suitable tooth for a case. Having a photograph of himself and of the model of his upper arch, showing the labial aspect of his central incisor teeth, he had the former reduced in size and both prepared upon lantern slides. (Fig. 6.) You can see by observing these illustrations that a line drawn from the region of the left to right temple and carried around the contour of the face, if placed inversely upon the central incisor tooth, gives its exact outline. This Dr. Berry had verified many times before he presented it and since then—about twelve years ago—I have never ceased to consider it in choosing teeth

in edentulous cases. That there may be some exceptions to this rule I would not deny, but, in a very large percentage of cases this will hold absolutely good.

The manufacturers of porcelain teeth cannot be reasonably expected to furnish sets of fourteen or twenty-eight teeth which can in any but the most general supply the needs of a given case as to shape, size and color. The average edentulous patient has passed the meridian of life, and a natural restoration demands an appearance of wear commensurate with the use his teeth would probably have had. The various stages of wear, beginning with the slight abrasion upon the incisal and

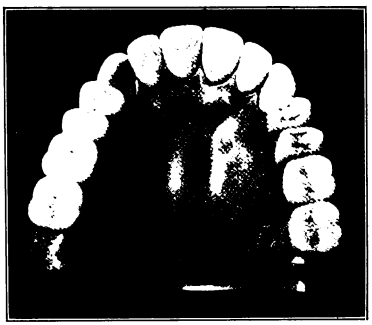


Fig. 7.

occlusal surfaces, passing through what is termed the second stage which simulates the checks and heavier abrasions, and finishing with the third stage which shows the extreme evidences of long usage are within the easy control of any operator, provided he is willing to spend a little more time in preparation of the case. These slight changes in teeth will make it possible to insert substitutes which will defy detection under ordinary scrutiny.

While the retention of dentures in edentulous cases depends upon proper adaptation of the bases and anatomical articulation of the teeth, with contact points preserved in the various positions of the mandible, the arrangement of the teeth in various parts of the arches in such positions as shall take away the absolute regularity is most advisable. The lapping of laterals and torsion of any of the anterior teeth adds much to the appearance of the case.

Continuous Gum.

A much neglected field of prosthetic dentistry is that of continuous gum work. Possibly the cost of platinum has much to do with this, as it makes obligatory a larger fee. There are many patients,

however, with whom the fee is not the first consideration and who would willingly pay a reasonable fee for such a restoration as is possible with this class of work. The opportunities, afforded by continuous gum work, of unlimited diversities in setting up of the teeth, in restoring gum contours and in reproducing the palatal surface naturally, are equalled by no other kind of prosthesis.

Porcelain Crowns for Full Dentures.

Full dentures may be constructed with a vulcanite base carrying crowns of the Goslee or Ash variety. The advantage of such a restoration is the opportunity afforded for full crown restoration, which is more natural in its appearance and affords great satisfaction to the wearer. (Fig. 7.)

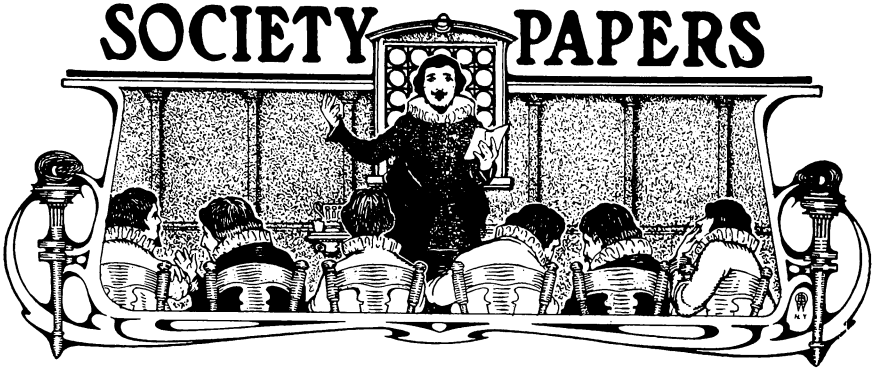
In conclusion, there are several things to which we all should give closer attention in our desire to improve present conditions:

First. The anatomy of the natural teeth bearing upon the details of form, color and individual peculiarities.

Second. Close attention to details of restorations in partial dentures in harmonizing the artificial with the natural teeth.

Third. The study of temperaments and characteristics of patients making it possible for us to restore extensive losses with a restoration which will tend to conceal rather than enhance the unnatural appearance so often seen.

SOCIETY PAPERS



President's Address.

By Dr. H. W. Le Fevre, Denver.

Delivered before the Colorado State Dental Association, at Manitou, June 19-20-21, 1913.

It is quite a pleasure to me to offer you a hearty welcome to our twenty-seventh annual convention, and to invite you to take part in the program arranged for this meeting. I hope it will result in mutual benefit and pleasure to all. We should congratulate ourselves upon having this beautiful spot at the foot of Pike's Peak for our meeting place, surrounded as it is by some of the most beautiful scenery in the world.

In looking over the list of the charter members of our association, I find only two of that list now on our membership roll—Dr. Wm. Smedley and Dr. C. H. Bagley. Dr. Smedley was our first President, and has been our Treasurer for twenty-six years. I hope the younger members will follow the example of these two men and remain loyal to the association, give it their support that it may grow stronger and larger, and help to elevate the standards of dentistry.

We are living in an age of scientific progress and advancement, and in the last few years the changes in the practice of dentistry have been almost revolutionary; and it is at such times as these that we look to our societies that the changes do not become too radical. It is quite a pleasure and a diversion to become a faddist in some lines of work and recreation, but it is dangerous to become a faddist in dentistry.

Commercializing Professional Spirit.

Some of our journals have become faddists on the "business side of dentistry" and "Brother Bill's letters." The practice of dentistry certainly has its business side, and it is often neglected by the dentist; but such articles as we have seen in our journals for

some time have a tendency to commercialize our profession, rather than to elevate its standards. "Brother Bill" must have been a traveling salesman before he entered the dental profession. We hear a great deal about our duty to our patients, but it seems to me there is nothing complex in that direction; simply give them the best services of which we are capable and the compensation will be based upon how well you succeed.

The advancements in all branches of dentistry have been so rapid and the changes in methods so frequent that time will not permit our going into details of each one. The office furniture, appliances and instruments have kept up with the fast-moving procession, and we often buy needless equipment simply because of the fear that we may fall behind. The dentist is often a ready victim for the smooth-talking salesman, and, through his fear that he may not be keeping up-to-date, he often buys appliances which in a short time only add height to the junk pile and a corresponding shrinkage in his bank account.

Gold Casting.

The gold-casting method has certainly revolutionized the art of filling and restoring the shape of teeth with gold; but the dentist who tries to entirely displace the foil filling with the cast inlay is making a serious mistake.

With the aid of the casting process we are now able to construct the ideal bridge, from a sanitary standpoint, especially those involving the posterior teeth. With cast abutments and the cast span, minus the porcelain facings, and large opening underneath, we have a bridge that is more easily kept clean than the natural teeth. One of the greatest mistakes in making bridges is in bringing the facings in direct contact with the gum tissue. A bridge constructed in this manner becomes unsanitary and a menace to the health of the wearer within twenty-four hours after it is placed in the mouth. We should construct more plates and fewer bridges.

The casting process should in a large measure supplant the shell crown, the majority of which, as ordinarily made and placed in the mouth, are a disgrace to our profession. The forcing of the edge of a shell crown under the free margin of the gum is bad practice and should rarely if ever be done, for it is as sure to invite irritation in that locality just as tartar would. The large approximo-occlusal cavities in molars and bicuspids offer the most useful field for the cast inlay, but the general usefulness of the process is hard to realize.

Amalgam.

Amalgam, the most used and the most abused filling material we have, is deserving of a higher place in our list of materials. It has the reputation with the public of being a cheap filling; and I am sorry to say that this is rather encouraged by the majority of dentists, for the prevailing fee for

an amalgam filling seems to range from fifty cents to a dollar and a half. I consider it quite a work of art to build up and restore the occlusion and contact points of a badly broken-down molar or bicuspid with amalgam, and the fee should be in proportion to the services rendered.

This reminds me of a question that was asked at a meeting one evening of the Cincinnati Odontological Society. The question: "If you were compelled to give up all filling materials but one, which one would you retain?" One dentist said, "Give me a barrel of arsenic and a ton of gutta-percha and I will fill and save teeth as long as I live." If I were to answer that question to-day I would say amalgam instead of gutta-percha, and I would save teeth the rest of my life.

Silicate Cements.

During the last four or five years it has seemed that our long-wished-for ideal filling for the anterior teeth was about to be found in the form of a silicate cement; but the success of these cements has been so varied in the hands of different men that I think they should be used with great caution and only in the most favorable cases. A thing to be regretted in this connection is that there is a tendency among some dentists to mislead the public by giving them to understand that this is a permanent porcelain filling, similar to the baked porcelain inlay. This is decidedly wrong, because of the comparatively short time the silicates have to be used, and if they do not prove to be what we hope, it will cause a just reflection upon our veracity.

Root Canal Treatment.

One of the great bugbears of past years in dentistry, that of the putrescent pulp and root canals, is a condition now handled with comparative ease by scientific treatment and root canal fillings; and has been the means of saving thousands of teeth each year which were formerly extracted. And notwithstanding these scientific and well-known methods some dentists continue to fill root canals with cotton and attempt the mummification of the pulp. I have very little faith in this last theory. The argument has been advanced that the Egyptians have been mummifying the entire human body with success, therefore we ought to be able to accomplish the same results with the dental pulp. But the surrounding conditions *must* be taken into account.

The Egyptians do not keep their mummified friends at a temperature of 98 and 2/5 degrees and in a casket surrounded by moisture and a host of hungry bacteria.

From the facility which bateria display for breaking into sealed and locked compartments of the human anatomy, they must carry a kit of

burglar tools around with them. They are apt to break into the tooth containing our mummified pulp, take a peep at the remains and invite a few thousand other members of the family to join them, and we all know that such an assemblage usually results in a very swell gathering. The embalming business is a dead issue, and I advise you not to attempt to revive it to any great extent in your daily practice.

The X-Ray in Dentistry.

The use of the X-rays in dentistry has become indispensable, but on account of the many dangers connected with its use I advise great caution in its employment. In fact, I think it should be left in the hands of an expert operator.

Dr. Howard R. Raper, of Indianapolis, has written a series of articles on this subject which have been published in the ITEMS OF INTEREST, beginning in the February number, 1911. In one of his articles he says: "The following unfortunate results have been attributed to the action of the X-rays; dermatitis, cancer, leukemia, sterility, abortion, insanity, lassitude and alopecia." Any agent capable of producing such dire results as these should be handled with great caution.

Pathological Results of Mouth Sepsis.

One of the most important subjects confronting the dental profession to-day is the pathological conditions found in the oral cavity, and in connection with it the absolute necessity for the medical and dental professions working more in harmony to overcome this, which is a constant menace to the health of the nation. The dental profession has been more or less aware of this for years, but all efforts in the past, comparatively speaking, to arouse the medical profession to the seriousness of the situation have failed. Recently their attitude has changed to one of great activity in this direction, and we should meet them half-way with all the support that our profession can command.

It is not my intention to take up the scientific side of this question, but if I can help to convince you of the importance of the thorough cooperation of both professions I think I shall have accomplished a great deal.

To convince you of the seriousness of the medical profession in taking up this work, it is only necessary for you to read carefully the great number of papers recently written on this subject and printed in our dental journals. I wish to call your attention especially to a paper written by C. H. Mayo, M.D., of Rochester, Minnesota, published in the *Dental Review,* April, 1913. In his paper he says: "That scourge of the human race, pyorrhea, accounts for an enormous amount of blood infection." Again he says: "It falls upon the dentist and oral surgeon to

study the diseased conditions of the mouth. The work is discouraging, but must be kept up, as eventually it will have its effects. The dentist's patients must be warned of the mouth as being by far the greatest portal of entrance of germ life into the body, *the most infected part of the alimentary canal."*

From this last statement I take it that Dr. Mayo wishes to make the point that the bacteria in the mouth enter the blood current direct through lesions existing in the mouth. Such lesions as are caused by pyorrhea, open fistulas from abscessed teeth, abrasions of the tongue and mucous membranes caused by the rough edges of decayed teeth, etc.

It is not the bacteria that we swallow direct with our food which do the most harm, for if that were true how few babies would live to adult age? Have you ever noticed a baby crawling around on the floor with a rubber nipple in its mouth? It drops the nipple, covered with saliva, on the floor or dusty carpet, but immediately picks it up and puts it back in its mouth while covered with dust. It goes out into the yard, stirs up a mud puddle to make mud pies, drops the nipple into the mud, and with fingers covered with mud replaces the precious nipple in its mouth.

The germs that a baby gets into its mouth in this manner must amount to millions, but they do not seem to do it much, if any, harm. Suppose the baby had a mouth full of decayed teeth, a bad case of pyorrhea, fistulous openings from abscessed teeth, abrasions of the tongue, and mucous membranes of the mouth, the result, I dare say, would be entirely different.

Another paper by Edward H. Baker, M.D., of Chicago, *"The Relation of Mouth Conditions to Bodily Health—What the Dental Profession Needs,"* was published in *Dental Review,* March, 1912. This is an especially good paper on this subject, and I ask all of you who have not read it to do so at your earliest opportunity.

Another paper, *"Oral Sepsis from the Physicians' Standpoint,"* by Judson Daland, M. D., published in the *Dental Cosmos,* November, 1912. I call your attention to these three articles because they will give you an excellent idea of what the medical profession is doing and what they expect of us.

In this connection I would like to call your attention to two cases that prove how necessary it is for the two professions to co-operate

Case I. A young man whose home is in Denver, but who was employed in Salt Lake City, developed a severe pain in his face and head. His physician in Salt Lake City diagnosed his case as facial neuralgia, treated him for several weeks with no results; then changed his diagnosis to one of syphilis and sent him to Hot Springs, Arkansas. He was there for sev-

eral weeks with no benefit. They sent him from Hot Springs to Cincinnati to a specialist; no improvement. From Cincinnati they sent him home to Denver, as he said, to die. His physician here told him his trouble might be caused by his teeth. He came in to see me, and I assure you he looked a physical wreck. I found the cause of his trouble to be an exposed pulp in an upper first molar and an abscessed second bicuspid next to the molar.

The pulp was removed from the molar, using pressure anesthesia; the bicuspid opened, cleaned and sterilized and both teeth filled. The pain which had caused such long suffering and loss of sleep disappeared at once, and in less than a week he returned to Salt Lake. He told me that it had cost him two thousand dollars in money, the loss of a good position, and not a night's sleep without the use of an opiate for three months. He passed through the hands of four or five physicians before one suggested teeth or the dentist. We often see the statement that a certain number of people die every year from preventable diseases. How many of that number die from diseases having their origin in the mouth? We do not know, because we lack the scientific data upon which to base our conclusions.

Case II. The other case is that of a young man who was in one of our tuberculosis sanatoriums for treatment. He came in to see me about his teeth. I found nearly all of his molars and bicuspids decayed off to the gum line; I counted six or eight abscesses discharging pus into the mouth. I asked him if they had examined his mouth at the sanatorium, and he said "Yes." I asked him what they said, and he said "Nothing." I told him that the first thing to do was to extract all roots and parts of teeth that could not be saved. He said that he would have to get the consent of the sanatorium physician first. I am sorry to tell you he did not return, for I was anxious to see what effect it would have had on his tubercular condition to put his mouth in a sanitary condition. From these two cases you can readily see how necessary it is for the two professions to work together.

In regard to solving these important questions of the pathological conditions of the mouth and their relation to lesions remote therefrom, it naturally seems the duty of the dental profession. But a condition that affects about ninety per cent. of the people of the nation is so serious and of such magnitude that it is certainly the duty of the Government to take up the work with as little delay and red tape as possible. Governments move slowly in such matters, and it is likely to be a long time before they will take up the subject.

If the sheep and the hogs, the horses and the cattle, were losing their teeth from decay and pyorrhea as rapidly as a large per cent. of the people are, there would be unheard-of activity in the bureau of Animal Industry at Washington. It is impossible for the dentist who is practicing dentistry as a means of livelihood for himself and family to give this subject the attention which it demands; nor does he have the facilities in the usual dental office for research work. It should be taken up by men efficient in this line of work and with a salary attached sufficient in amount to relieve them of any worry in regard to the financial support of themselves and their families.

The National Dental Association, appreciating the importance of this great work, and realizing the almost hopelessness of inducing the Government to take it up at this time, have started a "Scientific Foundation Fund of the National Dental Association." The *Dental Review,* May, 1913, says: "The committee having this matter in charge, under the able chairmanship of Dr. W. A. Price, of Cleveland, Ohio, are making most encouraging progress in securing funds to carry on original research work. The plan is to obtain a pledge from the profession to pay in the equivalent of one dollar per year for each member of the profession for five years, by which time there is no doubt that endowments will be available to make the work permanent."

In the solving of this problem of the pathological conditions in the mouth, the dental profession has the greatest opportunity before it that it has ever had to establish itself on a more scientific basis from which it cannot be shaken. I ask you to consider this seriously and contribute the one dollar per year for five years. This is the minimum amount asked for, but if anyone feels that he can subscribe a larger amount it will be very gratefully received.

If the people were properly educated as to the dangers of unclean mouths they would be of great help in clearing up this almost prevalent condition, but nearly all the information the public receives on this subject is through the advertisements of the quack dentist. This would be remedied as speedily as possible by ethical publicity and education through the medium of newspapers and magazines.

Reorganization of the National Association.

The reorganization of the National Dental Association is now assured; but the success of the movement will depend somewhat on the attitude taken by the different State associations. It is the desire of the National Association that all State associations should join as constituent societies including their full membership. Therefore, I recommend that the Colorado State Dental Asso-

ciation join the National Dental Association as a constituent society including its full membership.

Membership. As our membership is our only source of revenue, it is my opinion that it is not large enough, and some systematic efforts should be made to secure new members, and with this object in view I recommend that the Membership Committee divide the State into districts (say each county form a district), and in each district appoint a sub-committeeman, whose duty it shall be to make a list of every dentist practicing in his district, giving the information whether he is a member of the State Association or not, ethical or unethical, those whom he thinks should be invited to join the association, and any other information that would be of service to the committee, and send it to the chairman of the Membership Committee before the first day of May of each year. In this way the association would have a complete list of every dentist in the State and his standing.

We are in need of some additional dental legislation, and I recommend that a Legislative Committee of three be appointed to serve until the meeting and adjournment of the next session of the State Legislature.

The subject of railroad rates and transportation comes up every year. I recommend that a transportation committee of two be appointed to attend to such matters and report to the President and Chairman of the Executive Committee.

I wish to thank you for the honor of having been your President for the past year, and want to assure the different committees of my appreciation of the work they have done, and to thank the members of the association and the dentists from out of the State who have contributed to our program and clinics. I wish the association and all present a prosperous year and hope to have the pleasure of seeing all of you here at our next annual meeting.

The Manufacture of Alloy and the Manipulation of Amalgam.

By CHESTER C. FARRELL, Gothenburg, Neb.

Read before the Colorado State Dental Association at Manitou, June 19th-21st.

I find it difficult in writing on the subject of amalgam to condense the essentials within the brief space covered by one paper.

Personal experience and observation, together with tests of physical properties of alloys, have convinced me that we, as dentists, are too careless in the manipulation of amalgam on the one hand, and the majority

of manufacturers are both careless and ignorant of their work on the other. I shall, therefore, try to point out in this paper some of the shortcomings of each, and endeavor to suggest means of correction. A great reform in both the manufacture and the manipulation is needed.

The salvation of teeth is the end toward which we should all strive, and to this end a great revival is called for. Could the dentists throughout our country awaken to the conditions actually existing, and have pointed out to them the way of salvation through amalgam, such a revival as has been heretofore unknown in our profession would follow. It has been nearly twenty years since Dr. Black pointed out the way to us, but we failed to see it.

Our faith has not been wanting, but our hope was not thoroughly awakened. The gospel of better amalgam and better manipulation should be preached and heard all over the land.

The character of the average amalgam work done in this enlightened age of scientific cavity preparation, extension for immunity, the study of bacteriology, etc., by no means does credit to a scientific and artistic profession. A great reform is needed in both the manufacture and manipulation of amalgam. The average manufacturer will not reform until forced to do so by the dentist. Some manufacturers seek to supply the best in every line of their output. A few have already equipped their plants with the necessary instruments for making a scientific alloy, but these are rare exceptions.

There are two distinct methods of manufacture. One, a set formula, and the other a scientific balancing of the metals entering into the composition of the alloy in which shrinkage of one metal will exactly counterbalance the expansion in the other. In the former plan the metals are so proportioned, combined and treated as to make pleasing working qualities. The first consideration is a salable article. Many dentists use this kind of alloy because of certain working qualities which suit their fancy. They are cheap in composition, but valueless as a means of conserving tooth structure. The latter considers only the quality of the fillings made of their alloy.. They depend upon the dentist who desires the best to learn to use the best, regardless of working qualities.

All scientific alloys are balanced, according to the method discovered by Dr. Black and given to the profession in 1895.

Dental Alloy Metals.

The metals that have been used to any extent in dental alloys are silver, tin copper, zinc and gold. Many others have been tried but are not used to any extent.

Silver is the element of strength in all alloys.

It increases in volume when amalgamated. It increases strength and lessens flow, and because of its affinity for mercury when properly exposed it hastens setting. It tarnishes in sulphureted hydrogen and soluble sulphides. It causes the mass to work hard.

Tin, united with mercury in all proportions, forms a weak crystaline compound. It retards setting, decreases in volume when amalgamated, decreases edge strength, increases flow and produces an easily worked mass.

Copper unites with mercury with great difficulty at ordinary temperatures. It increases the strength when used in not to exceed five per cent., decreases flow, does not contract nor expand, and is easily tarnished.

Zinc amalgamates easily, thus aiding to produce a nice-working mass It seems to be continually expanding or contracting. In Dr. Black's laboratory we took a filling that had been made ten years, containing three per cent. of zinc, and by changing the temperature of the room we were able to record movements, which proved to us that any alloy containing zinc is unfit for making amalgam fillings.

Gold adds no desirable properties in any proportion. It causes amalgam to be springy and difficult to pack.

Dental Alloys.

There are in common use to-day two distinct classes of alloys.

First, a low per cent. silver alloy which has easy working qualities, amalgamates easily, packs easily, has good color, shrinks badly and flows worse, and sets very slowly. These alloys are made because there is a demand for them. They are used because there is no difficulty in using them, and they have a very good appearance for a time. These alloys contain from forty-three to sixty-five per cent. silver and forty-eight to fifty-eight per cent. tin, and from one to five per cent. zinc.

The second class are known as balanced alloys. They contain from sixty-five to seventy-five per cent. silver, twenty-five to thirty-five per cent. tin, and sometimes copper and zinc. They are quick setting, work rather hard, require more mercury, and are supposed to be tested so as not to shrink; they have remarkable strength and flow but very little under ordinary conditions.

The basic idea in what are known as "balanced alloys" is that metals are dissolved in each other in such proportions that movement in one will exactly counterbalance movement in the other.

Alloying.

The value of amalgam alloys depend very largely on the manufacturing process. This would include the manner and method of melting the metals, tem-

perature at which they are melted, time they are kept molten, the thoroughness of the solution, the temperature at which they are cast, and the rapidity of cooling.

The electric furnace is used for this purpose and is devised with a thermostat and accurately controlling rheostats. This is kept surrounded by hydrogen gas, and the lower fusing metal is first brought to solution.

The higher fusing metals will dissolve quite readily in the lower fusing metals with a very slight increase in the fusing point. Great care and skill are required in this process to produce a perfect solution.

There are frequently formed in alloys that have been overheated what are known as eutecticons. In these eutecticons two or more metals have formed a mass differing in percentage to the metals as originally intended for the alloy.

It is essential that alloys should be formed in perfect solution. Where the solution is not perfect and contains such eutecticons as I have described, the working qualities of the alloy must vary in proportion to the variation of the metals in the separate alloys found.

If a portion of the alloy used in a certain filling chanced to contain a large proportion of silver, it would be found to produce a filling difficult to amalgamate, would expand badly and require a large amount of mercury. Or if another portion contained a large amount of tin, it would be found to amalgamate very easily, take up less mercury and would shrink and flow badly. Such uneven solutions are not permissible in our endeavor to obtain a perfectly balanced alloy. After the pouring and cooling of the alloy, the filing should be done very slowly, so as not to produce heat and cause an uneven tempering of the alloy.

The following is Dr. Black's latest statement regarding the alloying process:

"An alloy is a solution of one metal in another metal, or several metals in one another. This solution is similar in its nature to the solution of common salt in water. To properly form an alloy the solution must be complete. That is, every individual cubic centimeter of salt water, or of the alloy formed, represents the same percentage of its ingredients as the whole of the body of which it is a part.

"The alloying of metals must be done in the molten state. Time and agitation enter into the question of complete solution. Yet a high-fusing metal may often be dissolved in a lower-fusing metal without raising the temperature more than a few degrees higher than the melting point of the alloy formed. This is done best in the closed crucible in an atmosphere of hydrogen to prevent oxidation. The metals enter into solution one with another, or several together, in all proportions, only some dif-

ference in readiness of solution being noted. In this solution there seems to be no question of chemical union of the metals.

"The formation of eutecticons in alloys of metals, when overheated, is a frequent occurrence. In this, two or more alloys are formed in the mass, differing in the percentage of the metals contained and in the fusing points. To the ordinary observer this may be seen by remelting the alloy under favorable conditions for observation and closely observing its behavior. If there are eutecticons, the lower fusing alloy will become fluid at a certain degree of heat. The particles of the higher-fusing alloy will be afloat in this, but not melted. This may be so abundant as to give the metal a doughy consistency at this stage, then a higher degree of heat is necessary to melt this higher-fusing alloy and render the melt complete. The condition of the metal when between the two melting points will vary as the lower and higher melting portions differ in abundance. Dentists in using die and counter die metals observe this condition often in the alloys that have been melted many times.

"A precisely similar thing occurs in solutions of salt water, when cooled several degrees below the ordinary freezing point of water. A portion of water will freeze. This frozen portion is found to have only a certain comparatively low percentage of salt, while the remaining mother liquid is richer in salt.

"There is no other use of alloys in which attention to all these details in forming them is so important as for amalgam making.

"Any change in the alloy from the perfect result changes its relation to mercury, and especially any failure in obtaining a perfect solution of each metal in the other, or leaving some portion as a mixture instead of a solution, so changes its relation to mercury as to destroy that perfect balance of metals on which the accuracy of results depends."

Color of Amalgams.

The further dangers of a shrinking filling are shown in the causes of discoloration.

Dr. Witzul has demonstrated in his work that it is quite impossible for a tooth to discolor from a filling that does not leak.

A filling which will exclude moisture and sulphureted hydrogen, which is so frequently found in the mouth, has no means of discoloration. Therefore, the only opportunity for discoloration of the tooth must come from shrinkage of the amalgam. The exposed part of the filling we expect to discolor.

We know from experience that it is possible to have shrinkage, leakage and discoloration without having a recurrence of decay; the effect of the oxides and sulphites seem to have a preserving effect upon the tooth tissues, and unless the margins fail within an area of susceptibility there may be no decay in years. Perhaps the filling was in a mouth that had

been immune for years and only failed when a period of susceptibility returned. God Almighty's immunity to decay has preserved more teeth filled with amalgam in the past than have good alloys and good operations, but given a perfectly balanced alloy and good manipulative ability they can be made permanent operations even in a susceptible environment.

Annealing of Alloys. It has long been known that alloys undergo a change with age. Different reasons have been advanced as explaining the change. Some still believe that it is caused by oxidation of the filings of alloys from exposure to the atmosphere. This is an error.

Dr.Black has proven beyond any question that this change is produced entirely by heat.

The degree of aging is dependent upon the degree of heat and the length of time.

Exposure to air produces no change unless heat is present.

Inasmuch as heat proved to be the only factor in this change, Dr. Black termed it simply tempering or annealing of metals.

All commercial alloys must be annealed before being placed on the market, in order to render their physical properties as permanent as possible.

A fresh-cut alloy which will make a good amalgam immediately after cutting will show marked shrinkage after a few months.

If the alloy is fully annealed, the maximum shrinkage will occur at once and no further movement will appear.

If the alloy is partly annealed, only part of the shrinkage is overcome, and age will continue to change the alloy until it is fully annealed.

Many tests have been made to determine the degree and time of heat for proper annealing, and it has been determined that shrinkage decreases as the filings are heated in boiling water up to fifteen minutes. Longer boiling does not produce more shrinkage, but it will cause slower setting and less strength in the amalgam.

The stage of annealing at which no further shrinkage appears, Dr. Black has termed the "zero point" of annealing. A balanced formula annealed to this point is rather quick setting; if the alloy is annealed beyond this point, setting is retarded; therefore, any first-class alloy *must be quick setting.*

After alloys are correctly annealed, time or age continues the process of weakening or softening.

The best alloys possible to make will finally grow so old, standing on the shelf or in the cabinet, that their utility will be destroyed.

Alloys should never be used after one year from the time of cutting and annealing.

Our only means of protection in this respect is to refuse to accept a package of alloy unless the date of manufacture is plainly stamped thereon.

Slow setting is an evidence of overaging; also the percentage of mercury required diminishes as the age of the alloy advances.

Balanced Alloys.

To produce a perfectly balanced alloy with commercial tin and silver is a very delicate process, requiring many tests and accurate measurements with the micrometer.

The point at which this balance is found varies from 72½ to 75 per cent. of silver.

If it were possible to use chemically pure silver and tin, a definite formula could be established, but different lots of commercial silver vary in their impurities, so that it is necessary to form a balance with every lot of silver used.

In a series of tests made by Dr. McCauley, the balance point of silver-tin alloys was found to be between 74 and 74½ per cent. of silver. A variation of one-half of one per cent. would produce expansion or contraction sufficient to destroy the value of the alloy. He says:

"To be inaccurate 1/10,000th part of an inch in measurement of the balance may ruin the filling. To miss the balance point one-half of one per cent. in proportion of metals will produce this inaccuracy. Hence, to obtain a perfect filling the alloy must be scientifically balanced.

"There is no other way known of finding the balance point of alloys of metals, except that discovered by Dr. Black, which requires the employment of very close measuring, together with the most accurate technic in making. Therefore, we may conclude that the alloy maker, however skillful he may be, cannot make scientific alloy without the aid of such instruments as will detect the slightest movement in an amalgam while setting."

The practice of following a set formula for manufacturing an alloy is pernicious, and should not be tolerated by the dental profession.

The effect of shrinkage of amalgam is discoloration and recurrence of decay.

Shrinkage of one point, as shown by the micrometer measurement, may produce a ditch between the filling and the cavity wall as wide as 1/10,000th part of an inch.

The micro-organisms which produce caries measure from 4/10ths to 8/10th of a micron.

The micron is the 1/1,000th part of a millimeter, or 1/25,000th part of an inch.

Therefore, the micro-organism measures from 1/65,000th to

1/32,500th of an inch, and a few figures will demonstrate the fact that one point of shrinkage (measured on the micrometer with a scale of 1/10,000th of an inch) will open up a passage sufficient to admit three to six of these little offenders side by side.

Even less than one point of shrinkage will admit micro-organisms and decay may begin again where the cavity margin crosses a susceptible line.

Now, the question arises, "What should be done with the vast number of commercial amalgams which shrink from 1 to 5 and even 20 points?"

With his usual keen desire to know something definite regarding movements of amalgam, Dr. Black devised a micrometer with a scale reading to 1/10,000th of an inch.

With a filling placed in a steel tube designed by Dr. Wedelstaedt, a reading was made of the filling as soon as it was made. Subsequent readings were made at will, but particularly during the process of setting.

With a desire to have a more accurate micrometer with which to record movements of the filling, Dr. Crandell devised a more accurate one than the Black machine, with a scale reading to 1/25,000th part of an inch, with which he tests all of his alloys. If a batch should show shrinkage of one point, or 1/25,000th of an inch, it is discarded and re-balanced until shrinkage disappears.

Since one point of shrinkage would admit bacteria between the filling and the tooth, we have no reason to believe that such a filling in human teeth would resist the ingress of moisture under such pressure as might be accomplished in the human mouth, under pressure in the act of chewing certain hard and sticky food.

No doubt we have all had our attention called to these conditions, when our patients have complained to us that certain teeth which had recently been filled with amalgam caused pain when in the act of eating sweet food. We have dismissed such patients with different excuses, but with the thought in our mind that the trouble was all an unbalanced condition of the patient's mentality, when, in fact, the trouble was all caused by the unbalanced condition of the alloy that was a part of the amalgam filling, or else we had used faulty technic in packing the filling and had not sealed the cavity.

This state of affairs is indeed a calamitous one, and the attention of the profession should be given to its immediate correction.

Strength and Flow.

The strength of amalgam is next of importance to that of shrinkage, and has its dependence upon many factors.

Curiously enough, the greatest strength and freedom from flow of a silver-tin alloy is found at or very near the point of balance.

We find that a proportion of silver under 75 per cent. produces the stronger amalgam. When the proportion exceeds this amount a loss of strength and toughness is observed and the filling becomes more brittle.

Dr. McCauley records cubes of amalgam 85/1,000th inch in size, made from a balanced alloy withstanding a crushing test of 450 pounds, while cubes made from a chemically balanced formula broke at less than 200 pounds.

Strength will be greatly influenced by the method of mixing and packing. The strongest amalgam will be produced by a thorough grinding and mixing with the proper proportion of mercury.

Either too little or too much mercury will decrease the strength; also, a failure of sufficient kneading will cause a loss of strength.

Strength depends very largely upon the actual union of the mercury with the alloy.

If the union is not complete the amalgam will be brittle; if there is a surplus of mercury the mass will be soft and lack strength.

Strength is also modified by the age or aging process of the alloy. An overaged or old alloy is always weak.

By flow is meant the gradual moving out of an amalgam from under-pressure, either constant or intermittent. The flow of amalgam, next to shrinkage, is perhaps its most fatal defect. Some commercial amalgam. says Dr. McCauley, showed as much as 20 per cent. flow under 50 pounds pressure applied for a period of one hour.

Amalgam made from scientifically balanced alloys will only show from 1 to 3 per cent. of flow under the same pressure applied for the same time.

The overhanging margins, that you no doubt remember having seen, are not the result of expansion, but are either flow or an unfinished filling.

When a filling flows from a cavity it is not a process of increasing bulk, but of changing form, consequently there must be leakage at some portion of the cavity surface.

Dr. Black says that "Amalgam made of an alloy of tin and silver will have this property of flow in proportion to the tin it contains.

"Some alloys of a distinctly granular character resist flow better than those of a smoother nature. The difference in the rate of flow between different metals depends upon their plasticity, by virtue of which they yield to the pressure and allow the molecules to slip over each other and assume new positions."

Says Dr. Crandall: "To make amalgam of great strength we should follow the example of builders of great structures. I think amalgam

should partake of the nature of concrete. When the builder wishes to get the greatest strength from concrete, he uses crushed rock or sharp sand as his unit of strength. He uses just enough cement to fill the space between his units of strength and just enough water to fill the minute spaces that still exist between the small particles of cement. This produces one of the most resistant masses known to science.

"In a way our amalgam structure is of the same nature. Mercury dissolves out sufficient tin from our granules to fill in the space and form a solid mass. The strength of the mass depends upon the accuracy of the manipulation and the qualities of those granules."

Amalgamation.

The methods of amalgamation are various. Many men attribute their success with amalgam to their particular method of amalgamation.

There are those who use a rubber finger stall, or a piece of rubber dam; some do their mixing in the palm; others work their alloy in weak acids and amalgamate the filling while wet; there are still other methods, but these are the most commonly used.

To-day we are confining ourselves to a consideration of the high-percentage silver alloys. Experiments and experience show that it is best that they should be first thoroughly ground in the mortar; the time required will vary according to the quantity of alloy we are mixing, the percentage of mercury we have with it and the pressure and speed with which we work.

It should usually require from two to three minutes to accomplish this part of the work. The mass should be thoroughly ground for some time after it appears to be smooth, then removed to the hand for thorough kneading or rolling. If in this stage there appears to be an excess of mercury, such as to make the mass sloppy and not capable of being well worked, this excess should be squeezed out between the thumb and fingers and the kneading continued. This process requires about the same length of time as the grinding process.

If the mercury has been kept down to the proper stage, soon after the mass has become thoroughly smooth and plastic, it will begin to stiffen and show signs of setting, when it should be immediately introduced into the cavity. It is important that the mass should be of the right consistency, and the correctness of this consistency depends upon the operator's ability to pack the amalgam perfectly to place. If the mass is too soft it will be jelly-like and tend to spheroid and draw away from the walls. Such a filling would be worthless; it would not be tight; it would flow badly and lack strength.

We have been able to prove that it is possible to make the strongest

filling with amalgam that is worked very dry. Yet, while this is possible, I warn you that it is very difficult to get perfect adaptation and condensation with such amalgam.

The amalgam should at all times be sufficiently plastic to admit of its being perfectly adapted to the cavity, and all mercury in excess of this should be removed.

An excess of mercury is a danger, militating against the success of our filling. Amalgamation is not a chemical change and mercury in amalgam is the same as mercury in a thermometer or at any other place. If there is an excess it will be driven back and forth in the alloy granules, as it is affected by thermal changes, and a subsequent effect will be produced in the loss of strength of the amalgam.

Too much mercury diminishes the strength rapidly; too little mercury will cause the amalgam to be brittle and will prevent perfect adaptation.

The ratio of alloy to mercury should be determined for each lot of alloy and properly weighed before mixing. Although the effect of removing any excess of mercury is not very serious, it is a safer plan to have the right quantity.

It is seldom necessary to use more than six parts of mercury to four parts of alloy, and then there is usually an excess of mercury to be removed.

I wish to warn you that those qualities in an alloy that are generally regarded as easy manipulation are most surely opposed to good results.

The predominance of the metals that make amalgamation easy do not produce the best and most permanent results.

Packing Amalgam.

Before the amalgam is prepared, all details of the cavity should be complete, and the cavity free from moisture and free from the effects of moisture. The matrix must be thoroughly and properly adapted and all the instruments in readiness for the packing process. The amalgam should be introduced in fairly large pieces.

In the ordinary approximo-occlusal cavities enough should be introduced to fill about one-third of the cavity. There should at all times be sufficient to form a good mass ahead of the plugger. Pluggers should be selected that may be easily adapted to the cavity and as nearly the size and shape of the cavity as possible. This makes it possible to carry the entire mass forward with a great deal of pressure, and when the plugger is struck a sharp blow (with a lead mallet) it will force laterally and will wedge the amalgam to place.

By malleting amalgam we are able to get a better adaptation to the cavity walls and greater density to the filling. In a recent test we were

able to increase the strength of the amalgam about one hundred pounds by the use of the mallet.

Care should be used that too large a mass of amalgam be not introduced, that the force of adaptation may be sufficient to unite it to the preceding mass and that adaptation be perfect.

The amalgam should be placed rapidly and firmly; there is just a right time to introduce the filling material into the cavity; after this time crystalization has begun and the strength of the amalgam is being interfered with if manipulation continues. An excess of amalgam should be malleted into the cavity. As soon as the filling has been placed it should be left absolutely alone for a few minutes, at least, until the filling has become sufficiently hard that it may be cut, when large spoons may be used to reduce the excess upon the occlusal surface; usually by the time this is accomplished the filling has become sufficiently hard to withstand the removal of the matrix, if great care be used.

After the removal of the matrix, knives, strips and disks may be used in trimming the filling to form.

Amalgam will not retain a permanent polish until it has set a few hours, or, better, a few days. All amalgam fillings should be thoroughly finished and polished.

I have attempted to describe to you the most desirable alloys and the methods of handling them, so that it might be possible to prevent further decay in a tooth.

If all these steps are followed out carefully and the filling be not properly finished, so that the amalgam and enamel form a perfect joint, the work is of no value.

A rough and ragged margin will form the best possible home for colonies of bacteria, which will in time cause a loss of the tooth structure that we have sought so hard to save.

I have pointed out the weak places in the manufacture of alloy; I have attempted to explain the dangers from a filling that will shrink; I have told you what might occur if amalgam is lacking in strength, and if it be not properly packed and finished.

Proper Fees for Amalgam Fillings.

Now we come to the last and final weakness of the amalgam question, and one which I approach with a firm and steadfast purpose, viz., the universal understanding, or, rather, misunderstanding, that one amalgam filling equals one dollar, no more, sometimes less. This is not right, and until it is changed we need not expect better amalgam operations.

Amalgam as a tooth preserver has its virtues. It is destined for cavities in the back teeth, where for various reasons gold may not be

used. It is a material that requires even greater skill than does the manipulation of any other filling material.

Yet the possibilities of amalgam have never been reached and never will be appreciated until we, as dentists, demand and receive fees for such work in proportion to the skill required.

We of this country are a prosperous people, so much so that poverty is almost unknown outside of the great cities. There are very few people that cannot afford to pay for dental services.

Notwithstanding the popularity of the inlay at the present time, there is no doubt but that seventy-five per cent. of all dental operations are being made with amalgam to-day.

If you make amalgam fillings at all, I plead with you that you make good ones, that you give your patients who intrust themselves to your care the very best that is in you. Then, and not until then, have you discharged the duties of your profession and to humanity.

Dr. McCauley's Tests.

I have here a copy of a table of results of experiments made with a few alloys by Dr. McCauley before three State societies, each society appointing a committee to verify his notes. They are from his report to the National Dental Association made last September.

Each sample of alloy submitted to him contained only a number, so that he could not possibly know the name of the alloy or the manufacturer.

This table shows:

Where the testing was done.

The amount of shrinkage.

The amount of expansion and the time that the movement was followed up.

One point in the table means 1/10,000th of an inch.

These fillings were made in Wedelstaedt tubes 33/100th of an inch in diameter and 38/100th of an inch in depth. At the bottom of the cavity is a groove in which the amalgam is packed to prevent movement toward the orifice of the cavity.

Expansion is indicated by protrusion of the filling from the cavity.

Shrinkage is indicated by its drawing into the cavity, or away from the margin, either of which movements can be detected by the micrometer or microscope.

The binocular miscroscope is used to verify the work of the micrometer in both expansion and shrinkage movements.

Specimen No. 1.—Rego Alloy—No shrinkage; 4 points expansion; time, ten days.

Specimen No. 2.—Crandall's Alloy—No shrinkage; 1½ points expansion; time, seven days. Another specimen of Crandall's showed no

shinkage, no expansion; time, forty-five days. Another specimen of Crandall's showed no shrinkage, two points expansion; time, two months.

Specimen No. 4.—Twentieth Century Alloy—Shrinkage, one point; expansion, one point; time, ten days.

Specimen No. 5.—Tine-Dentalloy—No shrinkage; 35½ points expansion. Another specimen, no shrinkage; two points expansion. Another specimen, one point shrinkage, twenty points expansion; time, two months.

Specimen No. 6.—Globe Alloy—Shrinkage, 11 points, 1½ points expansion; time, ten days.

Specimen No. 7.—Fox White Alloy—Shrinkage, 5½ points; expansion 2½ points; time, ten days.

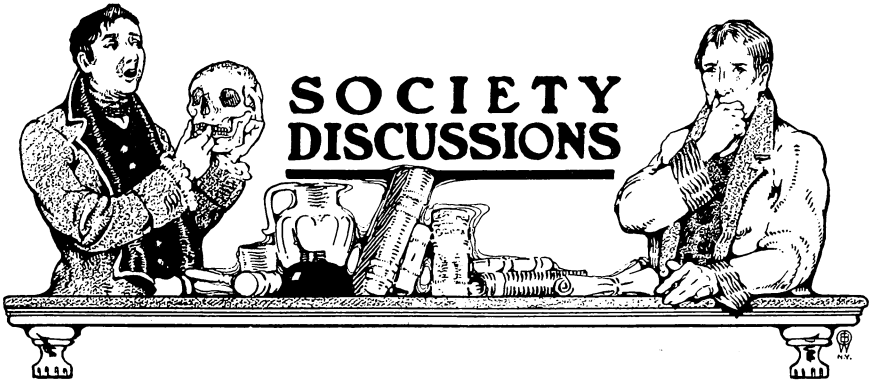
Specimen No. 8.—Standard Alloy—Shrinkage, 6½ points, expansion ½ point; time, six days.

Specimen No. 9.—Sterion Alloy—Shrinkage, 3½ points; expansion, ½ point; time, seven days.

Specimen No. 10.—Garhart's Gold White Alloy—Shrinkage, 4 points; expansion, 342 points.

Specimen No. 11.—Harper's Alloy—Shrinkage, 1½ points; expansion, 12½ points.

Specimen No. 12.—Par Excellence—No shrinkage; expansion, 62 points.



Central Dental Association of Northern New Jersey.

April Meeting.

Discussion of Dr. Hillyer's Paper.

Dr. E. C. Wheeler, New York.

Mr. President and Gentlemen: I came over here to-night to listen, and I feel that I am in the position of the man who went to a dinner and was called upon to speak, and he arose and said, "Gentlemen, when I came here to-night only God and myself knew what I was going to say, and now, God only knows."

I have listened to this paper with a great deal of attention, because I am somewhat interested in the subject and it seems to me that Dr. Hillyer has gotten at the question from a thoroughly practical and rational point of view. I am a student of Dr. Flagg's and I remember distinctly how thoroughly he tried to drill into our primitive minds the meaning of the word temperament, especially what he sometimes called a bi-temperament, that is a combination of the bilious and the sanguine, and the lymphatic and all that sort of thing. I believe that Dr. Hillyer obtained that idea from Dr. J. B. Williams, and Dr. Flagg took it up, and showed its advantages to dentistry and taught it all his life—and he was a teacher for many years.

I cannot criticise the paper because there is nothing in it to criticise, but I might supplement it. In those nervous temperaments, you will find the teeth are contracted and narrow at the neck, with decidedly deep cusps. In the modern attempt to imitate nature and get anatomical teeth, if in imitating the teeth of a decidedly nervous temperament they succeed in producing as deep sulci, and as well developed and as long cusps as they have in the natural teeth, you are

likely to find yourself using artificial teeth as they come from the dealers, and the patient will never be able to keep them in the mouth. They interlock so deeply in nature that if they were to be reproduced in artificial teeth there would not be the elasticity with artificial teeth as with the natural teeth, because the natural teeth stand in a socket that has a lining, and they move laterally, or vertically, but when you come to artificial teeth and have these extremely deep cusps and sulci, you will find they won't work. In the lymphatic temperament, the sanguine, and possibly in most of the cases of the bilious, the idea may probably work out, but it is not going to work out successfully in the well-defined cases in which the nervous temperament is the predominating feature, and it will be well to consider that in carrying out this work. There is another thing; in the lymphatic temperament you will find your teeth practically as broad as they are long—one of the marks of the lymphatic temperament is a broad tooth—and when they won't bite in the same place twice, and they slide together, you will find you have the lymphatic temperament in that case. They never stay anywhere. In the sanguine temperament, the manufacturers make all their teeth with that particular curve, and this is a mark of the sanguine temperament, and nearly all the other temperaments have a comparatively straight line, and about all the teeth the manufacturers furnish have that decided curve which you find very largely in the sanguine temperament. If somebody who had a nervous temperament or bilious temperament would consent to allow the manufacturers to take a model of his mouth he would do the profession a great favor.

I can only say in conclusion that I fully agree with Dr. Hillyer that this is the foundation upon which we must stand before we can do a great deal toward replacing teeth that have been lost, with substitutes that are so alike, or so akin to natural, that they cannot be detected ordinarily.

Dr. Hopkins. Dr. Hillyer has practically defined the various shapes of the teeth, but what about the shape of the palate of these various temperaments? I have certainly enjoyed the paper very much and I have been thinking over the subject a good deal, and that thought came to me when Dr. Hillyer was talking with regard to the different lines of the various temperaments—what in regard to the palate?

Dr. Weinstein. Mr. President and Gentlemen: I feel rather pessimistic this evening and I am going to speak a little off the subject, if I may.

We have a condition existing which is rather serious. During the

last meeting of the New Jersey State Society I was asked to discuss a paper by Dr. Wilson on "Prosthetic Dentistry," and I took the side of the laboratory man and explained the existing conditions, where practically eighty per cent. of the laboratory work is done in laboratories, and there was very little opportunity, if any, for artistic work or accurate work because the work is done by cheap labor. Now, it seems to me, the time has come when this condition must be handled without gloves. I do not believe it is possible to get the profession at large to do prosthetic work, and I say this with a full realization of what I say. It is all very beautiful and fine to go to dental meetings and hear ideals being preached, but there is not more than one man in ten possibly, who will even attempt to attain those ideals. They will say, "Yes, it is nice and all right," and that is as far as they will go. That is the situation as it really is. It seems to me if it is a case where the work is going to be done by the laboratory men, why not give the laboratory man an opportunity to do better work and pay him better and encourage him to do better work? There is more money in cheap work than in good work, and there are no good laboratories and there won't be any. If you pay them but a little more it is not going to be any inducement to them, and you will have to pay them a good deal more if you want good work. To those of you who do good work I say, Good for you. But the majority of you will not, because it takes too much time. If you are going to make sets of teeth right, the best you can do is to make two or three sets a week, and if you are going to take the teeth and polish them and grind them and stain them, it is going to take a long time to do that work properly alone, and the rest of the work takes time and will make it much longer.

So it seems to me that this work should be looked at from its actual standpoint and some means ought to be taken to cure the evil, and it seems to me the solution of the problem lies in concentrated effort on the part of the profession to obtain better teeth than they are getting now and to raise the standard of the labor that is doing the work. That is completely off the subject and I do not propose to have anything more to say on that except to tell you, gentlemen, that it is useless to fool yourselves and it is useless to neglect these things because it is going to injure you in the course of time.

The prosthetic work, and platework especially, being done to-day is not up to what was done ten years ago, and the work done ten years ago is not up to what was done fifteen years ago. That is rather a broad statement to make and I may be criticised for it, but I have good reasons for believing this because the class of labor put into this work is not what it was ten or fifteen years ago, and the men who have been in

practice fifteen years will, I am certain, verify what I say. Take a look at any of the rubber plates that come in for repair and you will notice those plates are better made and look more natural than the plates turned out to-day—for two or three dollars a-piece.

Dr. Wm. G. Hanrahan. Mr. President and Members of the C. D. A.: I do not know that I can offer any criticism on the paper of Dr. Hillyer, but while he was speaking on the different temperaments and the different shapes of teeth to be confined to the different temperaments, the thought came into my mind of some of the new molds made by the dental manufacturers. They have put out two different and distinct molds. I will not call them by names; undoubtedly they are in your mind. One of the difficulties I encounter is in small mouths, and I have been glad to fall back on some of the old molds that have been long since relegated. If you use some of the new molds now on the market in very small mouths you encounter great difficulty. They are so broad. If we have the sanguine temperament I suppose we can use the larger teeth, but if we do not and we have to use the large teeth in the smaller mouths, we cannot make these so-called "new-idea" teeth fit, I do not know whether that is the name, but they do not meet the conditions. If we are to dwell on temperaments, let us have temperamental sets of teeth according to the shape required and let the manufacturer manufacture them.

I think, as the former speaker said, that the prosthetic work done fifteen or twenty years ago is superior to that done to-day, but I think it was largely due to the dentist doing his own work or supervising it individually and putting his own ideas into the work, if he did not do it personally, instead of sending it out to the laboratory. If you want ideal results you must inject your own ability into the work and supervise it.

I think Dr. Hillyer's paper is ideal if it could be carried out, but it is almost impossible. I have come across men here in our city, and they think themselves too good to soil their fingers by doing mechanical work—and they can hardly meet their obligations. Some of them will not make a plate, and how can they be good prosthetic dentists if they do not do the work individually? I think if the men got together and everyone would make a plate or two plates a week we would all be better prosthetic dentists; instead of trusting the laboratory man to carry out the technique of the work we would get much better results if we at least supervised it ourselves.

Dr. Taylor. Mr. President and Gentlemen: I hardly feel that I can discuss this paper intelligently. I have gotten more good, helpful, practical points out of it

than anything I have heard for a long time. I do not do a great deal of prosthetic work; but whatever goes out of my office is all my own work. I devote a good deal of my time to orthodontia and casting and inlay work, but it seems somehow that the prosthetic work does not come my way.

Perhaps we all feel that there is no one man who could cover the entire field of dentistry. I think it would be impossible to do that and do all of the departments anything like justice.

One subject I have never gone into is the matter of the staining of the teeth, and I think we have a field there that can be made very helpful. I was glad to hear Dr. Hillyer say he finds as many as eight shades in a given mouth. Many a time I have made up a set of teeth with six different shades; but I find that in this kind of work it is necessary, and it has been my practice, to spend a good deal of time with my patients and instruct them as to what is a natural and proper restoration of the mouth. I have a friend in East Orange who does very good prosthetic work, and I met him on the train some time ago and he told me about a case he was making, a full upper and lower, and all the fine things he was going to do with that case to make it what a woman of fifty-five or sixty ought to have, and I was in his office a little later and he showed me the work in process of making up and it certainly met all the requirements, but the woman would not take the teeth out of his office. She said "No, sir, I don't want any crooked, dirty looking teeth like that in my mouth; I want them pretty." So I say, if we are to do this kind of work, it will take time and we must educate our patients up to it. It is nothing for the orthodontist to spend an hour or two hours doing that. You must teach orthodontia to your patients before they appreciate what you are attempting to do, and drill them so they won't get heart disease when you tell them what it is going to cost.

I believe, as Dr. Weinstein says, that our prosthetic work is steadily going down hill, simply because we are not doing the work ourselves. I can remember years ago Dr. Pool in South Brooklyn, who was the man who first gave me the inspiration to become a dentist. He had his own laboratory. In those days they did not know what sending out work to the laboratory man was; and Dr. Pool certainly was an artist. He had a very unfortunate experience afterward that took him out of the profession, but his work was very artistic, and he spent hours and hours getting a natural arrangement for his teeth, and that appealed to me, and a good many of the points I got from him in those days I have followed out.

Dr. Kane. I would like to say that Dr. Hillyer's paper is all right, in spite of the commercial aspect into which dentistry has fallen; he has struck the keynote. Mechanical dentistry, prosthetic dentistry, is in a deplorable condition to-day, but that is no reason why a conscientious man like Dr. Hillyer should not appeal to us to try to make it better. The average man has to turn out a lot of work because he cannot get enough to pay him to put his whole endeavor into each case, and he has to give the work to the mechanical man to execute it. At the same time we have been very negligent because even mechanical men can help you along a great deal if you get in personal contact with them. That is not what we have been doing. We send the case out and give instructions to use large teeth or small teeth and tell them the patient is so many years of age. If we would go over to the laboratory personally and instill some of our ideas into the laboratory men they will do a great deal more for us. I know of practitioners who are of high standing and they will send a case to the laboratory and say: "Set the teeth nice and even, and if they don't fit I will grind them." I have known of a case where an upper denture was by mistake sent to a dentist not the one to whom it belonged, and he ground at those teeth until he fitted them. The other man who had received his set could not use them and sent them back to the laboratory, and when he got his own set back they were ruined and he could not use them because they had been ground all out of shape. That is a deplorable way of working, and I am glad we have men like Dr. Hillyer.

There is another thing I want to speak about and that is the matter of acoustics. That is one of the most difficult steps in dentures. Acoustics in science are never understood. We have buildings with beautiful acoustics and they have been accurately reproduced, but without the acoustic properties, and we must get dentures that will not break up the sound and take away that full volume of sound as it is produced from the larynx.

President Kussy. I want to be pardoned for taking the floor personally to express my disapproval of the last speaker's statement that the profession is drifting into commercialism. It is my impression that we are getting away from that, and I wish Dr. Hillyer would touch upon that phase of the situation in closing the discussion.

Dr. Hillyer. I had no idea we would drift quite to where we have, but to take up the president's suggestion, it is one of the questions we usually put into the background, and I would much rather leave it out than to discuss it. I have

talked against commercialism upon three separate and distinct occasions in different parts of the country during this year. By that I do not mean to imply that I do not think a man should get the value of his services, for I certainly do. I have made the statement, and I repeat it here, that I think that a man who is doing conscientious work in dentistry is getting far below the fee that he ought to get. I spoke in regard to this subject in Pittsburgh in January and I made the statement there that a man who was making a large income in dentistry would be making twice that or three times that in law, and probably would be making three or four times that in general surgery. But as far as the commercial side of the profession is concerned, I think that will take care of itself, Dr. Kussy. I think that the patients will appreciate what we do for them, and I think in the long run the fee question will be advanced to a position of its own.

I am going to speak in regard to one or two things that Dr. Weinstein referred to and I may refer to that again.

Dr. Hopkins, in order that we shall not lose the drift of the discussion, you were speaking about the subject of palates. You will admit that palates are just as harmonious as the arches. I think that no matter how long a person lives, whether the alveolar processes are absorbed away or not it has been said that if the vault portion were cross-sectioned and you took a piece of cardboard and put it into the vault portion and laid that on the arched portion you would find they would match. In other words, if you take the shape of the sanguine, you are going to have the same kind of shape in the dome portion as compared to the arch of the teeth. The same way with the bilious, the lymphatic and the nervous; they are just as characteristic of one as of the other.

Dr. Weinstein touched upon a subject that I usually like to leave out, and I had no thought of bringing it in, but I must take issue with him. He said the plates of ten or fifteen years ago were better than those of to-day. There were fewer of them. Perry, Northrop, Jarvie and Littig all had the same question asked of them and they said, "It is not because the work is poorer to-day; it is because we see so much more poor work." There is just as good work being done to-day by the Weinsteins and the rest of them as was ever done by any of them, and there is just as good work being done by the profession.

As far as the laboratory question is concerned that is a proposition all by itself. I cannot carry all this work in technique forward absolutely myself; I am free to say I do not, but every step of that work, as far as the individual characteristics are concerned, lies with me. Nobody can do that but the man who has operated and sees his patient in the

chair, and if we had a good man carrying it out exactly as we want it and bringing those results back to us so we can carry it up to the very last step, that is all that is necessary. I do not think it is requisite for a man to spend his time to make up two cases a week, because there are very few who can do that.

Dr. Weinstein. You agree with me anyway. Suppose you take the five per cent. just as you say—what about the other ninety-five that send out their work?

Dr. Hillyer. Since you ask about that, it is the ninety-five per cent. we are trying to influence and we hope to reach fifty per cent. of them by and by. I am not pessimistic in regard to the future of dentistry. I agree with you except in this regard: I do not think, if we were to take the percentage of the bad and the good fifteen years ago and ten years ago and then take the percentage of the bad and the good to-day, that they would be very much different.

Dr. Weinstein. Just as you say, we see more work to-day. While we see more good work and poor work, the percentage is not the same. There is more poor work to-day than good work; the percentage of poor work is greater; in other words, the percentage of good work has decreased and of poor work has increased. In inlay work we are doing better work than years ago, and the same with crown work, but not in the long, tedious operations that take so much time.

Dr. Hillyer. I cannot compete with that statement because there is no way to prove it. But I do not think the situation is so bad as you say.

Dr. Hanrahan spoke of the typical sets. There are none to-day. They are nearer typical than they were, but there are no typical sets, as sets. Dr. Williams is at work now—and of course we are not ready to say that it is going to be successful or that it is going to be a failure; we simply hope for the best. He is making his plans now for the making of fifty molars that will cover all the types in the various sizes. It is a question whether it will prove possible in the hands of Dr. Williams and Dr. Gysi, who are working together. It remains to be proven whether the result of that will be all that is hoped for by those men.

Every manufacturer has some good molds, but I do not believe that you could pick out a mold or even one set to furnish what would be required in a given set unless you give it the same kind of appearance all through, and therefore it would be necessary to make some changes

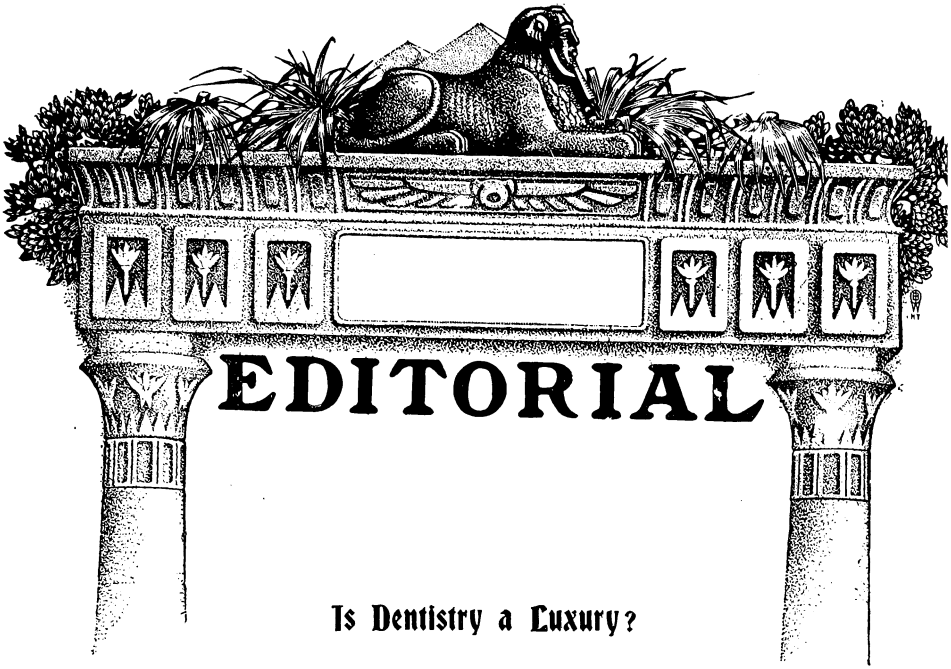
and some selections as you may need to make by selecting out exactly what you want for a given part of the case.

If we could have no ideals toward which we were working we might as well stand still. I did not come over here with the idea of preaching ideals; nor was I holding up in my paper anything that I imagined would serve as an ideal. That was not my thought at all. I realize we all have our faults and I simply indicate to you these things that are simple things, and a great many of them are simple, indeed, but they can be utilized. I know a man who spent six months on a case of continuous gum work and that meant the studying of his patient in every kind of position and attitude, all kinds of conditions, making a set, and working upon it and then having that patient come back to be observed under certain conditions and making changes and reconstructing until finally, after having added here and there and changed and changed and changed, he produced at the end of six months a case for which he charged four thousand dollars.

I appreciate Dr. Taylor's words very much and I brought these thoughts over here with the idea of doing exactly what Dr. Taylor said. The little things that were presented he might take and utilize in the case he has before him. What I wanted to get into the discussion was some things I could take home and apply to my own use.

This is all a matter of evolution and a matter of education, and we are trying our level best to inject into the student mind some of these things which you call ideals, and which perhaps are ideals, but which, after all are nothing more nor less than practical work, and if we do not hold them up to them they will fail. Who can tell what the next generation may do with what we are trying to do? But we should take things as they are and do the best we can. (Applause.)

(On motion a vote of thanks was tendered Dr. Hillyer and the gentlemen who discussed the paper of the evening.)



EDITORIAL

Is Dentistry a Luxury?

At a dental meeting held recently in Philadelphia a prominent New York dentist made the assertion that "dentistry is a luxury." Of course he meant good dentistry.

Is this true? If so it is a matter of the utmost importance to the people at large. It therefore is a question worthy of discussion.

What is meant by a luxury? The term is generally applied to that which is costly but not strictly essential to life, happiness or well being. Thus, among foodstuffs, terrapin, turtle, and canvas-backed duck are luxuries, whereas, eggs, butter, milk and meat, however high priced, are necessaries of life.

As dental caries is a widespread disease, the treatment of it must be counted a necessity, rather than a luxury. It is evident, therefore, that the dentist quoted meant that the proper treatment of teeth in the most scientific manner entails so much time and skill on the part of the operator that he must have fees so large that only the wealthy can afford to indulge in the "luxury" of that class of dentistry. This is true, and

being true, it means that the poor, or those who cannot or will not pay for proper dental service, are receiving a very poor substitute, something indeed not often worth even the low fees that are charged.

Office Equipment.

In the first place, let us consider what a first-class dental office means, because it is scarcely probable that first-class dentistry is delivered in any other sort of office. The equipment of an up-to-date office necessitates considerable investment in capital, and a still further expense in annual renewals. It means floor cleaning, window cleaning, laundress for office nappery, laundress for office coats, office assistants of various kinds, etc., etc. And not the least of these et ceteras is the sterilizer. The people have been taught the dangers of infection from unclean instruments, and the demand is for an absolutely aseptic dental office, with aseptic dental service, performed with aseptic dental instruments and aseptic materials. But few patients realize what asepsis costs. The dentist, however, knows.

The Filling of Teeth.

The filling of teeth to-day means something totally different from what it did twenty years ago, or even ten years ago. Once upon a time, the filling of a tooth merely meant the removal of the decay, and stopping the hole with some material more or less resistant to the stresses of mastication, and to the fluids occurring in the mouth. Teeth were filled with gutta-percha, cement, amalgam or gold, largely according to the pocketbook, and seldom with any special relation to the patient's real and lasting welfare. Unfortunately much of that sort of dentistry is still prevalent. But that style of service is not a luxury, it is indeed hardly a service at all, because too often it costs the patient in the end very much more than it is worth.

To-day the filling of a tooth has a greater significance. The aim is to preserve in health and functional usefulness the tooth under treatment. First, that it may continue to maintain and support its neighbors, and serve at the same time to prevent its antagonists from rising in their sockets and thus protruding above the occlusal plane. Second, there must be a perfect restoration of tooth form; approximately, to preserve contact with adjacent teeth, and occlusally, to restore its masticatory function. In small cavities this may still be done with gold foil, but in large cavities the

gold inlay must be utilized. Third, the filling must be so inserted that the dangers of a recurrence of the disease may be reduced to a minimum. This requires the scientific preparation of the cavity, with especial care devoted to the form and position of the margins. All of this means time added to the operation, and time in this era spells money. Fourth, in the anterior teeth we must utilize the porcelain inlay, the successful application of which is a high art in itself. With these obejcts in view the high-class dentist ever works, and he cannot work in this way, conducting a thoroughly aseptic office, for moderate fees.

Root Canal Treatment and Filling.

If caries is not stopped in time, as we all know, the result must be exposure and final death of the dental pulp. Whether the canal be found aseptic, the pulp being alive, or septic because of the death of that organ, the time, skill and actual labor involved in thoroughly cleansing and thoroughly filling even a single-rooted tooth, is often greater than the time, skill and labor expended by the general surgeon upon operations for which he may charge a hundred, five hundred, a thousand dollars, or more. If a dentist should charge two or three hundred dollars for root canal work his patients and even many of his confreres would count him little less than a thief. Yet often the service rendered to the patient, in relation to the restoration or preservation of his general health, is immeasurably greater than would be entailed in the removal of a tumor, the splinting of a broken limb, or an appendicitis operation. One great difficulty is that the patients do not suspect this, and many dentists even do not comprehend it.

Dentistry a Luxury.

Dentistry of this class, dental service where the filling of every tooth is counted as an operation necessary to the preservation of the general health; where the choice of material or method of filling does not depend upon the whims or pocketbook of the patient, but upon the diagnosis made by the operator with a full knowledge of the requirements of the case, and with the skill to apply the remedy; where root canals are treated without regard to the number of radiographs, or the number of hours required in order to assure a perfect and aseptic root canal filling, or the amputation of that portion of a root which cannot be made safe; dentistry of this sort requires an expensive office equipment,

arduous labor, skill and, above all, a conscientious determination on the part of the operator never to stop short of the best possible service. It is dental service which is necessarily expensive, and deservedly so. Hence this best, this ideal type of dentistry may be counted a luxury, because its cost limits it to the few.

But the important deduction from all this, is not that this ideal type of dental service is desirable, but that really it is an essential and in that sense it is not a luxury, but should be counted a necessity, since anything short of the best service in dentistry is very apt to become a real damage to the patient; as, for example, when improperly filled root canals cause unsuspected abscesses, which in turn sap the system with slow poisons, causing general debility, or some one of the diseases which may arise from this source and which may even shorten life.

But even the necessities of life may become so costly that they cannot be enjoyed. If beef were a dollar a pound the people would be compelled to live on bacon, or some cheaper substitute. So it is with dentistry. The true service is necessarily so expensive that only the rich may afford such "luxury." The poor must be content with the cheap substitute even at the expense of danger to health and life. He who cannot pay fifty dollars for a properly contoured gold inlay, with fifty dollars more added to the bill for the aseptically, radiographically, perfectly filled root canals, must get along as best he can with the eight dollar shell gold crown, forced over uncleaned root canals containing "mummified," or nostrum treated dead pulps.

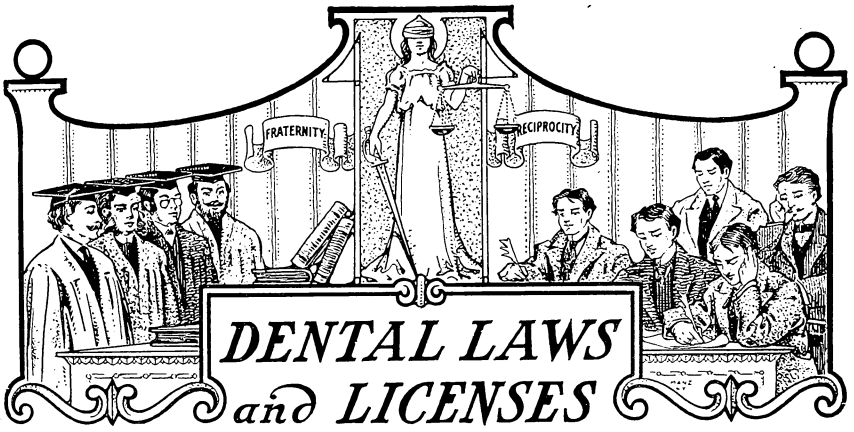
Is this true? It is not! If the people only knew the gold bricks they are buying, the gold-crown-over-mummified-pulp gold bricks could not be sold. And if the dentists were conscientiously working for the welfare and permanent well being of their patients instead of for their private selfish interests, each patient would be told the truth, which is that he can better afford to have a tooth extracted than to have it improperly treated and crowned. If dentists would but explain these facts to their patients they would earn more in the year, even though they might lose a few fees. They would have the satisfaction of knowing that their work at least had harmed no one, and that their services had been worth their charges. Moreover, by constantly attempting to practice only the highest type of dentistry, a higher skill and a

greater number of men endowed with such skill would be constantly elevating dentistry and the knowledge of the value of dentistry until at length it would cease in any sense to be a luxury.

The Solution of the Problem.

But the odd thing is that the solution of this grave problem is so close to our eyes that we do not see it. And the oddest thing is that the solution is one that dentists antagonize, when they should do all in their power to advance the cause.

The solution of the problem is contained in three words: "prophylaxis," and the "dental nurse." The menace of dentistry to-day lies in improperly treated root canals. If no pulps died, if no alveolar abscesses occurred, if no infections about tooth roots existed, at least all dental causes of general disease would be reduced to the minimum. Again, if no cavities were allowed to grow large; if all cavities could be filled before the pulps became endangered, then, of course, the fees for filling teeth would be reduced to the lowest. And all this can be done through prophylaxis, and monthly visits to the dentist, with caries cared for in its incipiency. But to do this—that is to say, to do it for all the community, at a price that all, even the poorest may afford, we must have the dental nurse. If there were as many dental as there are medical nurses in this country, and all at work, dentistry would no longer be a luxury. Dental practice would be less arduous—and dentists' incomes larger.



New Dental Status in Arizona.

(Signed March 20, 1913. To take effect ninety days later.)

TO REGULATE THE PRACTICE OF DENTISTRY, AND TO PROVIDE FOR THE ISSUANCE AND REVOCATION OF LICENSES THEREFOR.

Be it Enacted by the Legislature of the State of Arizona:

Section 1. Any person shall be deemed to be practicing dentistry who for a fee, salary, or reward, paid directly or indirectly to himself or to some other person, shall attempt to or shall perform an operation of any kind upon, or treat diseases or lesions of, or correct malpositions of, the human teeth or jaws.

Nothing herein contained shall prevent any person, duly licensed to practice medicine or surgery in the State of Arizona, from extracting teeth in the practice of oral surgery or the treatment of diseases of the mouth.

Sec. 2. It shall be unlawful for any person who is not duly licensed to practice dentistry in the State of Arizona, to practice dentistry in the State, or, by the display of a sign, or in any other manner advertise himself as being engaged in the practice of dentistry in the State.

Any person who shall violate any of the provisions of this Section shall be guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than one hundred dollars nor more than three

hundred dollars, or by imprisonment in the county jail for not less than three months, nor more than six months, or by both such fine and imprisonment.

It shall be the duty of the County Attorney of each County of this State to prosecute any violations of this Section in the courts of their respective Counties in which such violations occur.

In any prosecution under this Section a certificate under the hand and seal of the Secretary of State stating that he has examined the list of licensed dentists on file in his office, and that the name of the defendant does not appear thereon, shall be competent evidence and prima facie evidence that the defendant is not and was not at the time of the commission of the alleged offense a licensed dentist.

Sec. 3. Only the following persons shall be deemed licensed to practice dentistry in the State of Arizona:

(*a*) Persons duly licensed and entitled to practice dentistry in the State of Arizona at the time of the taking effect of this act; (*b*) persons duly licensed to practice dentistry in the State after the passage of this act.

Sec. 4. A Board of Dental Examiners. to consist of five duly licensed. resident, practicing dentists, is hereby created, whose duty it shall be to examine all applicants for license to practice dentistry in the State of Arizona, and to recommend the licensing of all such applicants as in their judgment are qualified to practice dentistry in the State.

It shall be the duty of the Board to adopt such rules and regulations for the conduct of such examinations as in its judgment may seem proper; to report to the proper officers all violations of the law whenever the same shall come to its knowledge; to keep a true and correct list of all the duly licensed dentists practicing in this State, with the address of each; to recommend the revocation of any license whenever, in its judgment, there appears to be sufficient cause therefor, and to furnish such evidence as it may have in its possession to substantiate such recommendation; and to perform such other duties as may be imposed by law.

Sec. 5. The members of this Board shall be appointed by the Governor of the State for a term of five years; Provided, however, that the members of the first Board, if otherwise qualified as herein provided, shall be the present Board of Dental Examiners, whose terms shall be so made and arranged by the Governor that one term shall expire January 1, 1914; one January 1, 1915; one January 1, 1916; one January 1, 1917; and one January 1, 1918. All vacancies occurring in said Board shall be filled by appointment by the Governor.

No person shall be eligible to serve on said Board unless he be a qualified elector of Arizona, and has been duly licensed to practice den-

tistry in Arizona for five years next preceding his appointment, and of good moral character, and the recommendation of the Arizona Dental Society shall be taken and considered by the Governor as prima facie evidence of such eligibility in making appointments to said Board.

Sec. 6. It shall be the duty of said Board to organize by the election of one of its members as president, and one as secretary; to adopt a seal which shall be the official seal of the Board; to meet at least once, but not more than twice, in each year, at such time and place in this State as the Board may designate, for the purpose of examining applicants and transacting such business of the Board as may be required. Written notice of the time and place and object of such meeting shall be mailed by the secretary of said Board to all members thereof and to all persons whose application for examination shall be on file with the Secretary of State, as provided in Sec. 8, at least fifteen days before the time of meeting.

Three members of said Board shall constitute a quorum for the transaction of the business of said Board, and for the purpose of examining applicants for license to practice dentistry in the State.

The secretary of the Board of Dental Examiners shall keep a record book into which he shall transcribe and keep a true record of all proceedings of the Board.

It shall be the duty of the Board of Dental Examiners, at its first meeting, to ascertain and determine the names of all persons who are duly licensed and entitled to practice dentistry under the provisions of this act, and to file with the Secretary of State a true and correct list thereof.

The Secretary of State shall keep a record book, into which he shall transcribe and keep a true list of dentists licensed to practice in this State, and necessary records of all proceedings relating to revocation of licenses.

Sec. 7. The Governor shall have the power to remove from office any member of said Board of Dental Examiners at any time, for the continued neglect of duty, or for incompetency, or for dishonorable conduct.

Sec. 8. Any person who shall desire to begin the practice of dentistry in the State of Arizona, after the passage of this act, shall file a sworn statement of his qualifications and shall make application to the Secretary of State for an examination by the Board of Dental Examiners on a blank furnished by the Secretary of State, and shall pay the Secretary of State an examination fee of twenty-five dollars, which examination fee shall in no event be refunded if the applicant is eligible for examination; provided, that any applicant failing to qualify for license

upon his first examination shall be entitled to one additional examination by the said Board of Dental Examiners at any subsequent meeting thereof, without charge.

Sec. 9. No person shall be eligible for examination by the Board of Dental Examiners who shall not: (1) Have been duly licensed to practice dentistry elsewhere in the United States; or (2) have a diploma from some reputable dental college, or dental department of a university.

Sec. 10. Examinations by the Board of Dental Examiners shall be of two kinds, viz.: (1) theoretical, and (2) practical. The theoretical examination shall be written in the English language and consist of questions and answers upon such subjects as are included in the curriculum of reputable dental colleges; provided, that the Board may conduct additional examination, orally, on such subjects, and no member thereof shall be prevented from examining any applicant on all such subjects. The practical examination shall consist of demonstrations in skill in operative and mechanical dentistry.

In grading all examinations the theoretical examination and the practical work shall be graded at fifty per cent each; provided, that the Board may allow applicants who have been engaged in the practice of dentistry for five years, sixty-six and two-thirds per cent for their practical work, and thirty-three and one-third per cent for their theoretical examination.

It shall be the duty of the Secretary of State, upon presentation to him of a certificate by the Board of Dental Examiners, certifying under the seal of the Board, that the person named therein is possessed of the necessary qualifications and is entitled to practice dentistry in the State, to endorse thereon under the Seal of the State of Arizona, a license to practice dentistry in the State.

Sec. 11. Whenever it shall appear to the Secretary of State that any licensed dentist practicing in the State of Arizona has been guilty of fraud, deceit or misrepresentation in obtaining a license; or of gross immorality, habitual use of intoxicants or drugs, rendering him unfit for the practice of dentistry; or of malpractice, gross ignorance, incompetency, or wilful negligence in the practice of dentistry; or of employing unlicensed persons to perform work which, under this act, can only be legally done by persons holding a license to practice dentistry in this State; or of committing any crime involving moral turpitude, either before or after conviction in court; or of practicing deceit or other fraud upon the public or individual patients, in obtaining or attempting to obtain practice; or of false advertisement, publication, or circulation of exaggerated claims, or fraudulent or misleading statements of his art,

skill or knowledge or of his methods of treatment or practice, he shall revoke the license of such person.

Sec. 12. An accusation may be filed with the Secretary of State charging any licensed dentist with the commission of any of the offenses enumerated in the preceding section.

Such accusation shall be in writing, signed by the accuser and verified under his oath, and corroborated by at least two reputable citizens of the State, likewise under oath, who are familiar with the facts.

Whenever such accusation is filed the Secretary of State shall set a day for hearing, and shall transmit to the accused a true copy of all papers filed with him relating to such accusation, and shall notify the accused that on the day fixed for hearing he may appear and show cause, if any, why his license to practice dentistry in the State of Arizona should not be revoked.

And for the purpose of such hearing the Secretary of State is hereby empowered to require the attendance of witnesses, administer oaths and hear testimony, either oral or documentary, for or against the accused.

And if, after such hearing of the accused, the Secretary of State shall be satisfied that the accused has been guilty of the offense charged in the accusation, he shall thereupon, without further notice, revoke the license of the person so accused.

Sec. 13. The Governor, the Superintendent of Public Instruction, and the State Auditor shall be, and they are hereby constituted a Board of Review, with power and authority to review any and all actions of the Secretary of State in revoking or refusing to revoke any such license; and the determination of the said Board of Review upon any and all matters submitted to it shall be final.

Any person who may feel himself aggrieved at the revocation of his license may have the action of the Secretary of State in revoking the same reviewed by the Board of Review in the following manner:

The person seeking such review shall file with the Secretary of State his affidavit, verified in the manner required by law, setting forth the fact of the revocation of his license, and that there has been a miscarriage of justice or error committed by the Secretary of State, or that the decision of the Secretary of State was contrary to law, or was not supported by the evidence adduced at the hearing.

In the same manner the Board of Dental Examiners may have the action of the Secretary of State in refusing to revoke the license reviewed by the Board of Review.

When such affidavit has been filed with the Secretary of State it shall be his duty, within ten days thereafter, to transmit the same, together with all the papers, records and documents pertaining to the case,

to the Governor, who shall, at such reasonable time as he may determine, and upon proper notice to all parties interested, convene the Board of Review at such place as he may determine.

Sec. 14. All expenses incurred by the Board of Dental Examiners for rents, lights, supplies and other necessary disbursements in holding the meetings of said Board, shall be paid in the same manner as the compensation of the members of said Board. Upon the presentation of an itemized statement of such expenses, verified by the Secretary of said Board, to the State Auditor, he shall draw his warrant on the State Treasurer, payable to said secretary of said Board, for the amount specified in such statement.

Sec. 15. The compensation of the members of the Board of Dental Examiners shall be ten dollars per diem each, while actually engaged in the business of said Board, and necessary travelling and hotel expenses incurred by them in the discharge of their duties. Upon a verified statement to the State Auditor of the amount due each member of this Board the State Auditor is hereby authorized and directed to draw his warrant on the State Treasurer for such amounts, and the State Treasurer is hereby authorized and directed to pay the same.

Sec. 16. All duly licensed dentists shall be exempt from jury duty in any of the courts of this State.

Sec. 17. All acts and parts of acts in conflict with the provisions of this act are hereby repealed.